Chemical Week

January 25, 1958

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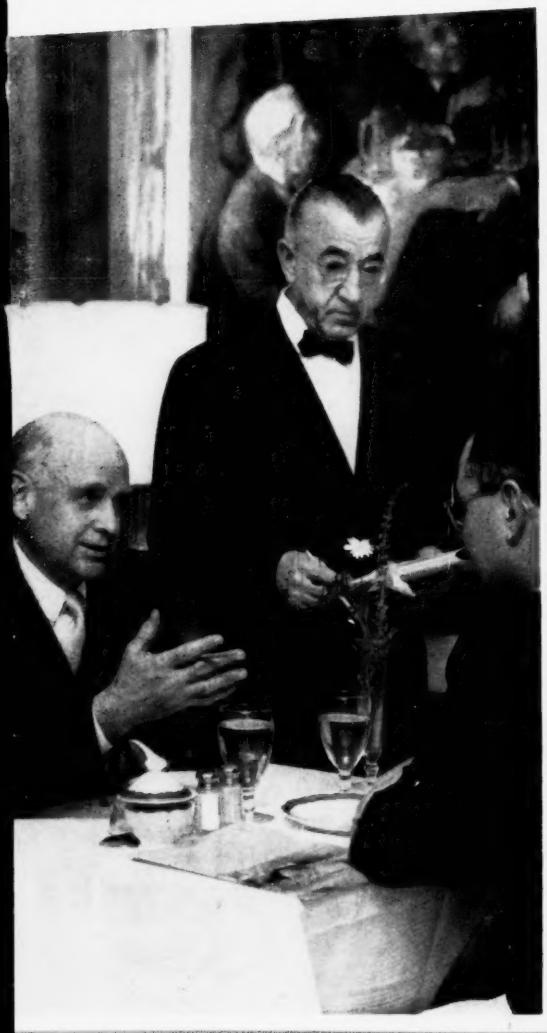
CW Report page 93

Keys to Cost Control



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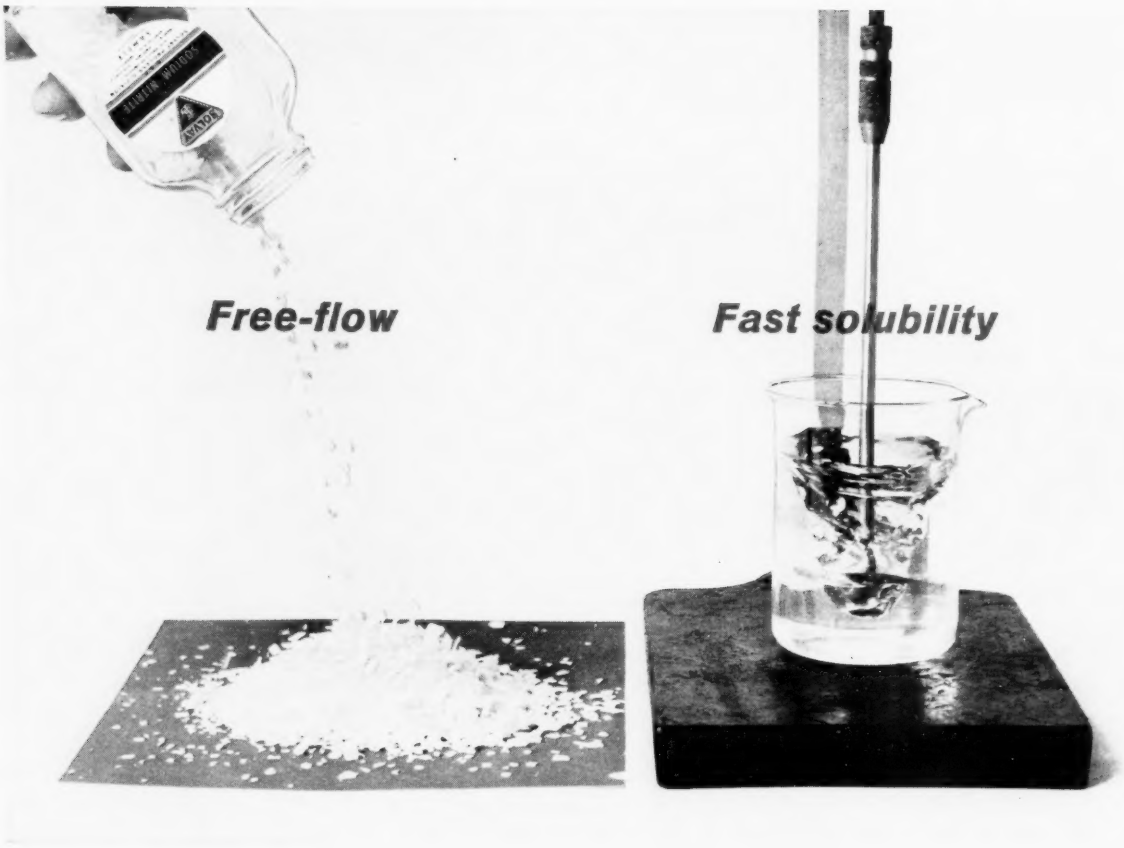

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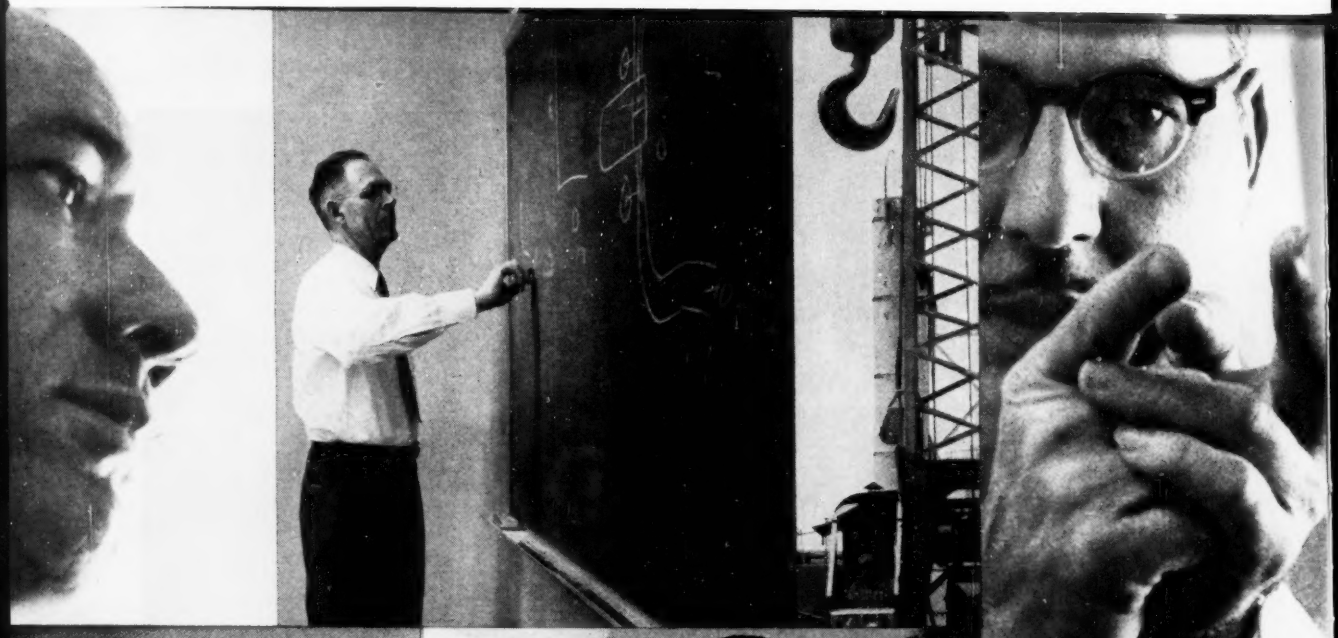

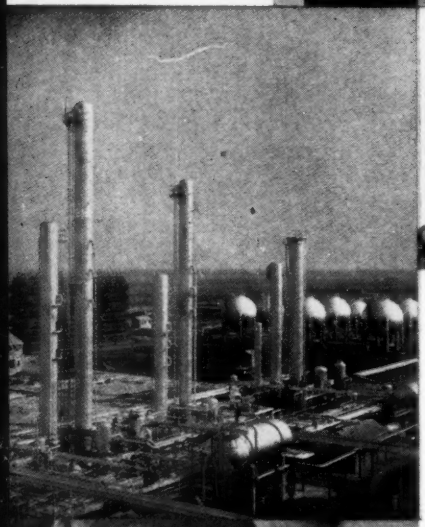

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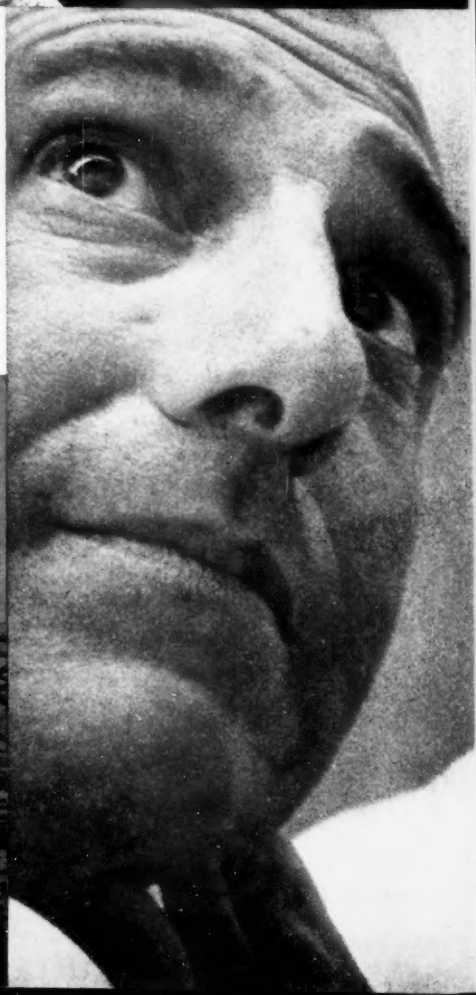

Chemical Week

TOP OF THE WEEK

January 25, 1958

Chemical and aviation company combinations set the pace in development of fuels, other rocket-age materials ..p. 31

CPI's re-examining electric-arc heating process—Asarco's new copper-refining process proves it's economical .....p. 44

Reformer hydrogen—tempting source for chemical processing—seems pretty well tied up by the petroleum refiners ..p. 63

Crash program puts new parathion plant onstream in 6 months, sets safety, construction speed marks .....p. 73

Vol. 82
No. 4

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Watch CW Grow — 40,158 copies of this issue printed

No embrittlement! Lowest cost! ASME Code approved!

In the subzero operating range . . . Specify Alcoa Aluminum equipment and piping

The flow chart details a tonnage oxygen plant now in actual operation where process temperatures average below minus 300° F. Notice that virtually all of the equipment and process piping are ALCOA® Aluminum. There's a good reason: aluminum is the lowest cost metal able to perform satisfactorily at low temperatures.

At subzero temperatures, ASME code approved aluminum alloys suitable for welded construction display improved yield and tensile strengths with no reduction in ductility or resistance to shock loading (see graphs). There is no embrittlement!

And in these operating temperature ranges, aluminum offers other valuable benefits . . . light weight . . . excellent resistance to corrosion . . . great strength in alloys . . . high thermal conductivity . . . nonmagnetic, nonsparking characteristics . . . nontoxicity . . . and excellent reflectivity. It is highly workable and lends itself readily to a variety of welding or brazing techniques for easy fabrication.

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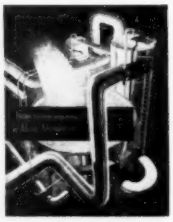
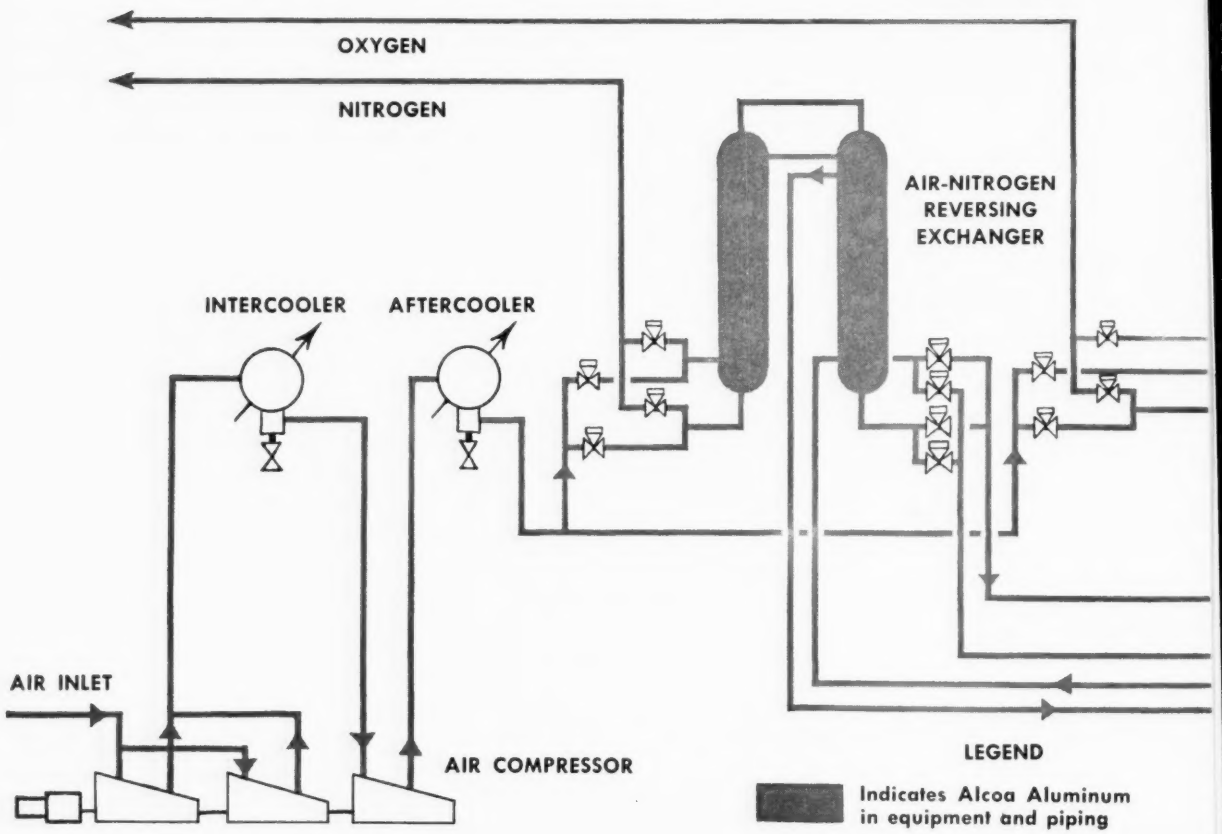
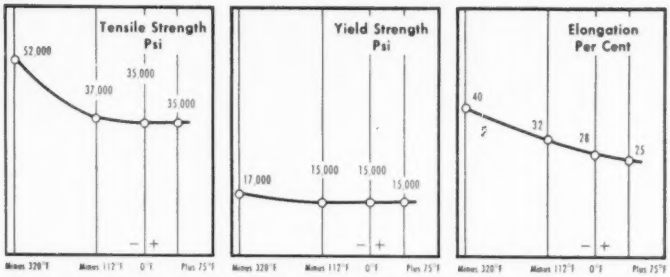


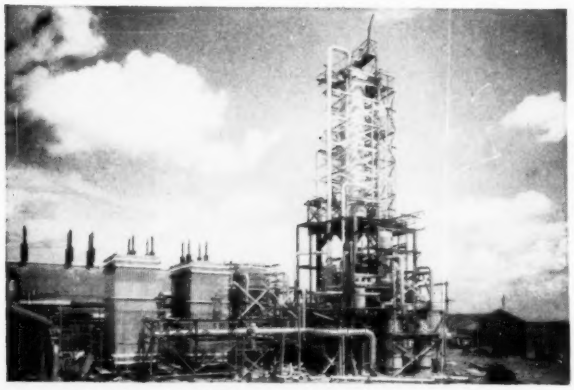
THIS FREE BOOK is filled with detailed data on the behavior of aluminum in the process industries . . . the result of more than 30 years of Alcoa engineering experience with aluminum in a variety of applications in nearly every temperature range. Use it as your guide to trouble-free, corrosion-free process equipment and piping. Write today for *Process Industries Applications of Alcoa Aluminum.*





LOW TEMPERATURE PROPERTIES OF ALCOA ALLOY 5154-0

Alcoa Aluminum actually increases in strength with no loss in ductility as temperatures drop to minus 320°F and below. Alloy 5154-0, for example, improves 50% in tensile strength, over 13% in yield strength and approximately 60% in elongation.



Photograph shows installation of Alcoa Aluminum equipment and piping in oxygen plant detailed in flow diagram. Harp-type heat exchangers (left) are dip-brazed assemblies with thousands of fins for best heat transfer.

Diagram of first successful low pressure tonnage oxygen plant . . . designed to produce 175 tons of 95% oxygen per day for the manufacture of oxygenated chemicals. All of the process piping and most of the equipment are Alcoa Aluminum.

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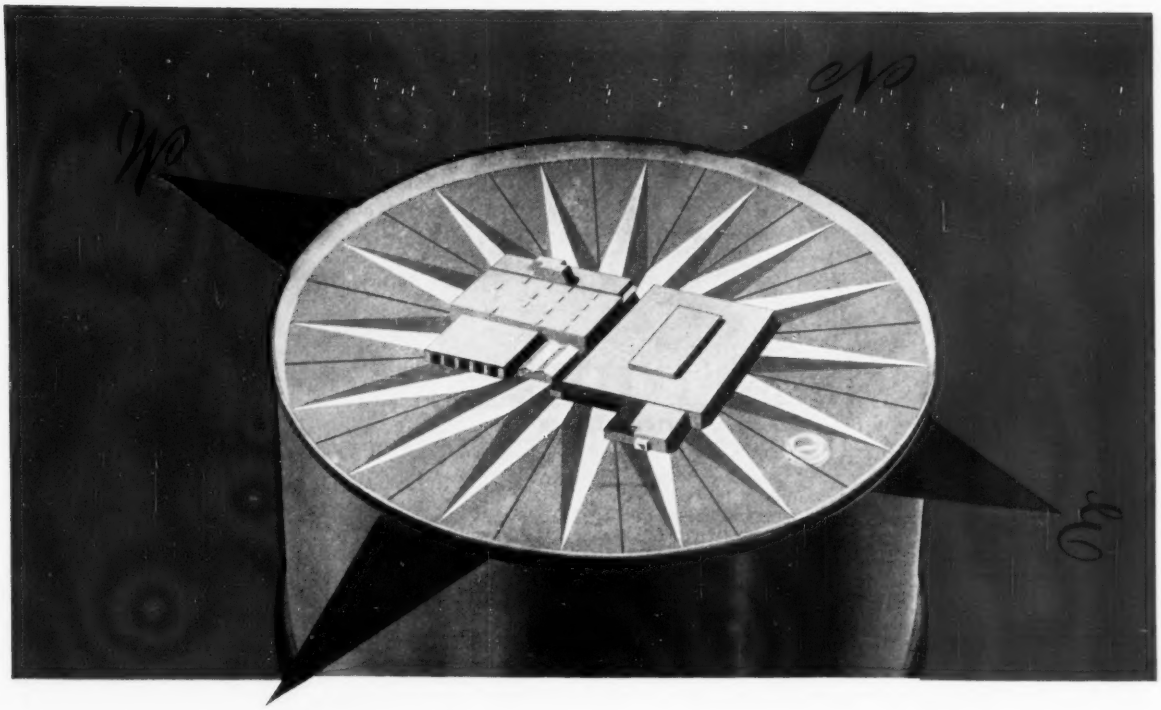

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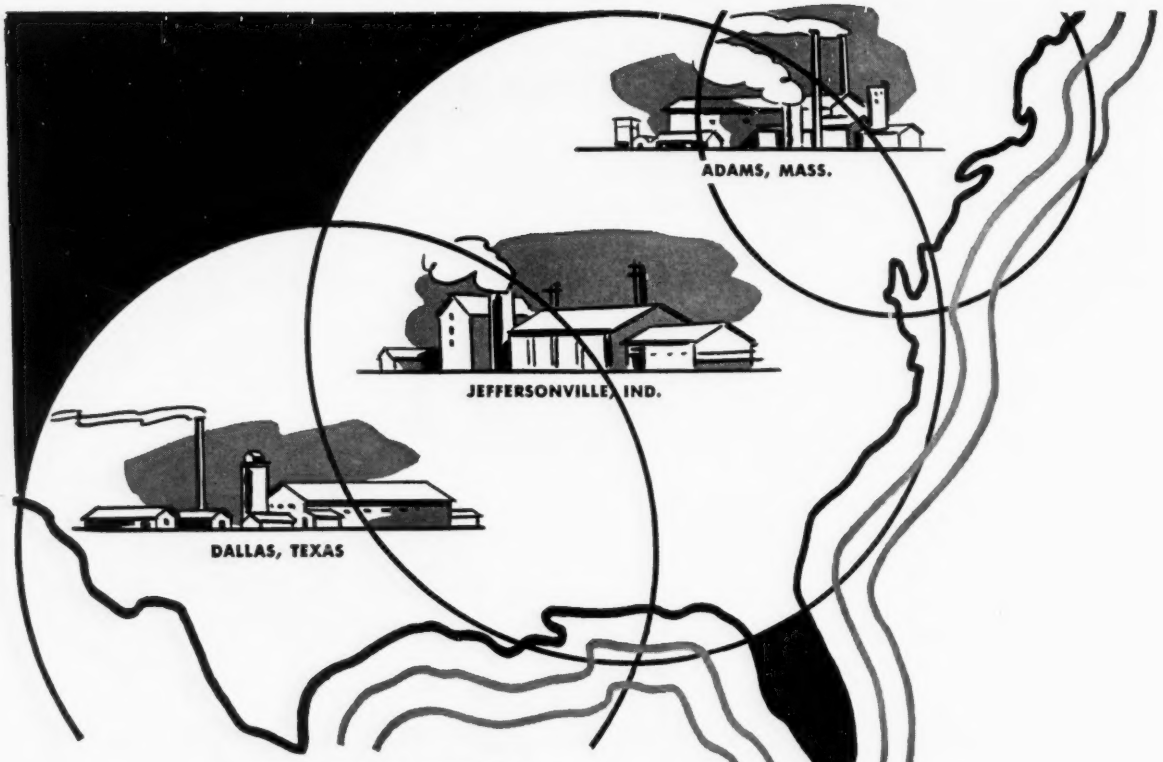

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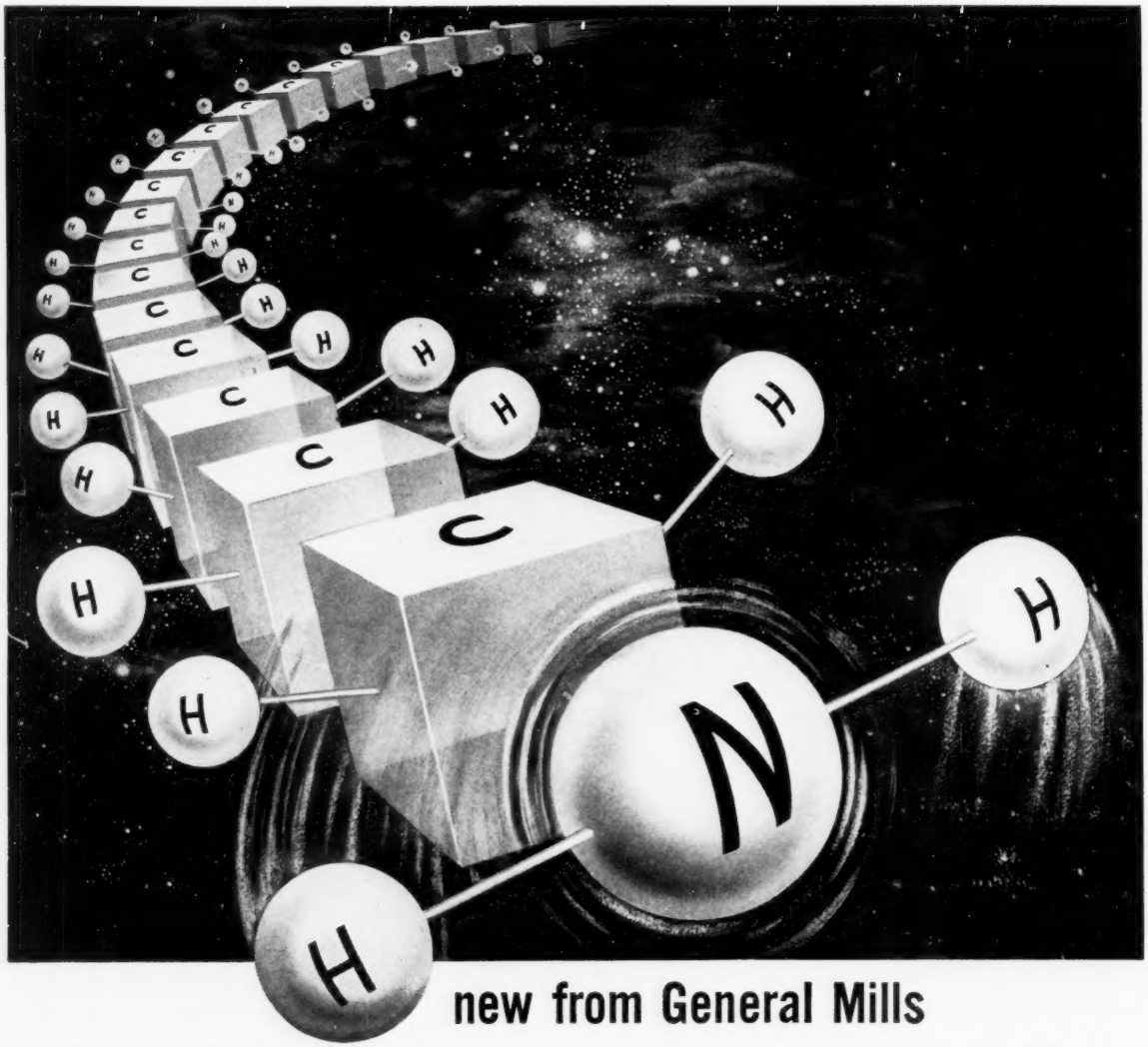

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these new fatty nitrogen derivatives are now on tap in commercial quantity

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Distilled palmityl—97% min.—Alamine 6D
Cottonseed—87% min.—Alamine 33
Distilled cottonseed—97% min.—Alamine 33D
Soya—87% min.—Alamine 34

Fatty Quaternaries (Aliquats)
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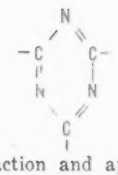


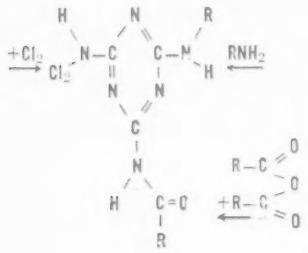
The unusual stability associated with melamine resins is shared by a great many triazine derivatives. As a result, they perform well under rugged reaction and application conditions. In plastics, adhesives, coating resins, textiles, leather, dyes, rubber and pharmaceuticals, triazines have become well established as components or additives. We think they are well worth your investigation.

Aero* Melamine

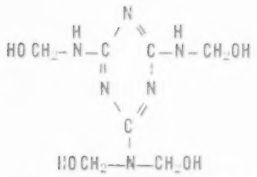
(2,4,6-triamino-1,3,5-triazine)

Most of melamine's reactions involve one or more of its six replaceable hydrogens. *Amines*, for example, react to produce alkyl-substituted melamines with the elimination of ammonia. *Dimethylsulfate* readily gives a methyl isomelamine salt which may be isomerized to methyl melamine.

Acid Anhydrides will give acyl melamines, usually going to trisubstitution. *Formamide* is the best route to the monoacyl derivative, formylmelamine. *Epoxides*, such as ethylene oxide, yield melamine condensates with polyether chains that contribute to water solubility.



Well known are the condensation polymerization possibilities of melamine after reaction with *formaldehyde* to form methylolmelamines. However, a relatively virgin field for development work is the utilization of the reactive methylolemelamines as intermediates. They may be etherified by reactions with alcohols, and analogous derivatives are obtained with mercaptans. Amines give aminomethyl derivatives.



(a typical methylolmelamine)

The Chemistry of Melamine—yours for the asking via our coupon—contains 52 pages of information on properties, reactions and applications.

Aero* Cyanuric Chloride

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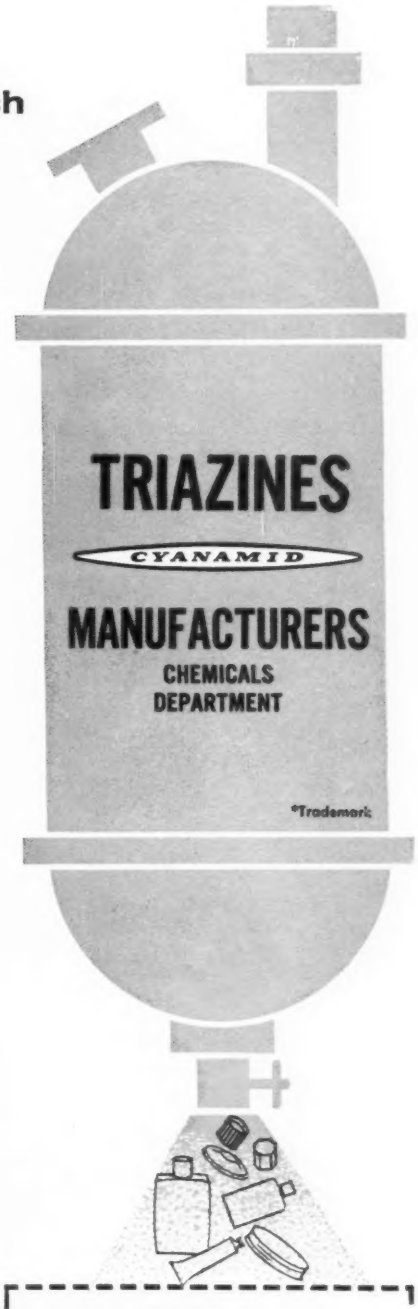
The chlorine atoms are centers of high reactivity in cyanuric chloride and may be reacted selectively. The rate and degree of reaction depends on various factors including solubility, temperature and the nature of the nucleophile involved.

Alcohols and *phenols* can be reacted under controlled conditions to give selective yields of mono-, di- or trialkoxy derivatives. *Mercaptans*, in the presence of alkalis, yield trithiocyanurates. *Amines* and related compounds react stepwise at increasing temperature ranges to replace progressively the three chlorines. *Arylhalides*, with sodium, effect an aryl substitution on the ring carbons. Friedel-Crafts reactions with $AlCl_3$ also produce triaryl triazines.

A 44-page Cyanamid bulletin, *Cyanuric Chloride*, gives all the information. Again we direct your attention to the coupon.

A Few Triazine "Comers"

Our New Product Development Department is actively evaluating and promoting a few newer members of the triazine clan. *Cyanuric Acid* is offered as a handy triazine intermediate. *Diallylmelamine* and *triallyl cyanurate* are showing particular promise as comonomers in plastics. Our New Product group has done a bang-up job of collating data relevant to reactions and applications and if you are interested in these variants of the triazine family, we suggest you contact them directly. Same address.



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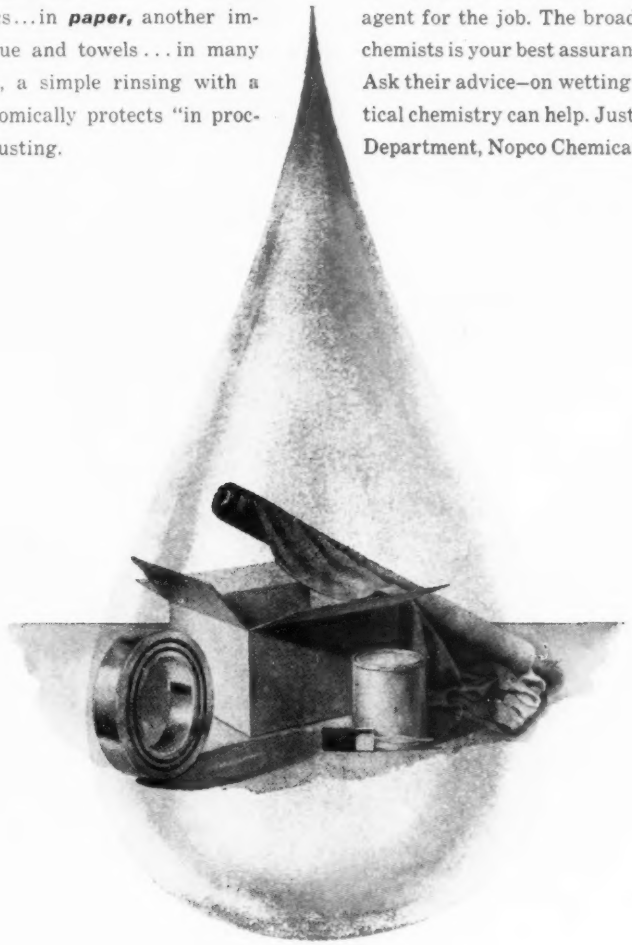

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U.S.I. CHEMICAL NEWS

January 25th ★ A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1958

New Non-Narcotic Drug Has Potency of Codeine

A new analgesic drug – dextro propoxyphene – is now on the market. It is reported to be clinically equivalent to codeine in intensity of analgesia, and in onset and duration of action. At the same time, side effects are said to be fewer. No toxic effects on liver, blood, brain, kidneys or other organs have been demonstrated. And, after several years of exhaustive tests, government authorities have classified the material as non-narcotic drug – producing no euphoria, tolerance or physical dependence.

Dextro propoxyphene hydrochloride also acts as an antipyretic, reducing fever, and as an anti-inflammatory, combatting local hyperemia and swelling. Clinical usefulness is expanded by combining this amino ester with other ingredients such as acetophenetidin, caffeine and acetylsalicylic acid.

Although chemically different from all other analgesics, it is believed to act in the same manner as meperidine, codeine and morphine – that is, by raising the pain perception threshold through depression of the sensory area of the brain.

Riboflavin Overcomes Boron's Growth Inhibition

A European microbiologist has found that riboflavin overcomes the growth inhibition of test organisms caused by boron. None of the other B vitamins have this effect.

These findings may have some importance in areas such as the American southwest where the soil has a high boron content. Boron is taken from the soil by plants which are consumed by livestock, and the element may tend to interfere with the vitamin metabolism of these animals.

Viscosity Changes May Be Clue to Chemical Activity In Complete Ester Mixtures

Investigations reported in the literature have revealed that the viscosity of true ester mixtures of ethyl alcohol, acetic acid, ethyl acetate and water changes steadily on standing. The conclusion is that association, dissociation, hydrate and solvate formation are taking place, and that viscosity determinations may therefore be useful in studying the progress of such activity.

Viscosity has long been employed to determine the extent of molecular association, and the degree of solvate and hydrate formation in liquid mixtures at some particular moment. It has never been used, however, to examine changes over time intervals.

In the study reported, relative viscosity measurements were made on complete ester mixtures after 2, 9, 21, 51, and 84 days. Viscosities changed steadily, but tended to reach an equilibrium value. The investigators feel that this time factor must be properly evaluated before further study of hydrates, solvates and association values is made.

Sorbitol Solubility Measured In Elixirs and Syrups Containing Alcohol and Water

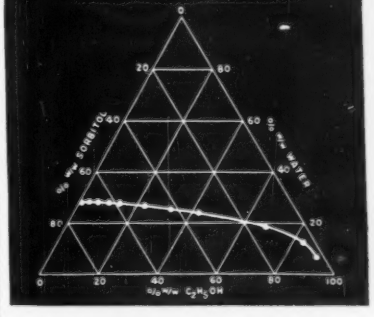
Studies Reveal Solubility of Sorbitol in Water-Ethanol Mixes

The hexahydric alcohol, sorbitol, widely used in liquid pharmaceutical preparations, has now been thoroughly studied in water-ethyl alcohol systems to determine extent of solubility. The table and phase diagram below show the results of this investigation. They indicate that a sizable amount of sorbitol can be incorporated into most pharmaceutical systems of hydroalcoholic character–about 65% by weight in 20% alcohol, about 50% by weight in 50% alcohol, about 14% by weight in 80% alcohol, and so on.

SOLUBILITY OF SORBITOL IN HYDROALCOHOLIC LIQUIDS AT 25°C.

Sample	% v/v C_2H_5OH	Sp. Gr. Saturated Solution	% w/w Sorbitol	% w/v Sorbitol
1	0	1.308	71.90	94.05
2	11.33	1.284	68.62	88.22
3	20.73	1.265	66.02	83.50
4	33.86	1.233	62.38	76.92
5	41.47	1.200	57.98	69.59
6	52.80	1.152	50.45	58.12
7	62.33	1.089	42.70	46.49
8	71.56	1.026	33.84	34.72
9	82.20	0.9123	13.64	12.42
10	90.94	0.8433	3.41	2.88
11	95.41	0.8177	1.92	1.57

Phase Diagram of Sorbitol Solubility in Hydroalcoholic Liquids at 25°C.



It has been well known for some time that while sorbitol is highly soluble in water alone, the solubility tends to decrease when ethyl alcohol is added. Since sorbitol acts as a vehicle in many cough syrups, elixirs and vitamin preparations which contain alcohol, the extent of this decrease has become a question of great interest to the industry. Until this study was made, no data on the subject had been available.

Properties which have made sorbitol useful to the food and drug industries include sweet

MORE

Polyethylene Use Is Extended by New Compounding Process

A process, whereby polyethylene is combined with 50% or more of carbon black to create compositions which remain flexible even at extremely low temperatures, has been developed by Godfrey L. Cabot, Inc.

These compositions are said to be strong enough for structural use where rigidity and pressure resistance are important. Creep and fracture are reported to be minimum.

A variety of molded and extruded parts have been fabricated successfully from the new material. Pipe, for example, has exhibited resistance to stress cracking, improved high temperature behavior, virtual elimination of plastic flow, and improved resistance to deterioration by solvents and oils. Lab tests have indicated that burst strength is doubled. The same applies to wire and cable cover.

Cabot feels that the development makes possible a new range of usefulness for polyethylene. They will not manufacture these compositions themselves but will supply the carbon black and their process knowledge to polyethylene producers such as U.S.I.

New Ceramic Textiles Withstand Heat of 2000°F

Aluminum silicate fibers have now been converted into a variety of textile forms for high temperature applications.

Fabrics weighing from 15 to 74 ounces per square yard are said to have excellent insulating properties due to low thermal conductivity, high yarn bulk, natural resilience and small fiber diameter. Stainless steel or nickel-chrome alloy wire is inserted into some constructions for greater tensile strength in the 1,000 to 2,000°F range.

Rovings and yarns in sizes from 600 to 1,000 yards per pound are useful as insulation for electric circuits that must withstand very high temperatures.

Rope from ¼ to ¾ inch in diameter is being applied as insulation and packing in various metallurgical refining processes.

Other suggested uses for cloth and tape include filter media, gaskets, heat and flame barriers and membranes, conveyor belts, protective clothing and insulating blankets.

January 25th ★ **U.S.I. CHEMICAL NEWS** ★ 1958

CONTINUED

Sorbitol

taste (about 60% as sweet as sucrose), high viscosity in water solution, lack of reaction with medicinal or other ingredients, ability to inhibit crystallization, and humectant action. It is often used in combination with glycols, glycerin and sugar syrup as well as ethyl alcohol.

Paper Can Now Be Made From New Acrylic Fibers

A new type of paper has been developed which will be of special interest to the laminating industry and for electrical uses, chemical filtration, chromatography and many other applications.

It is made of a new acrylic fiber, is binder-free, and can be produced on conventional machinery. Production quantities are expected in the near future.

First Caustic Soda Plant Established in Ceylon

May Also Produce Bromine

The first caustic soda factory in Ceylon, built by a government-sponsored corporation, is expected to begin operations this month. It is equipped with 56 electrolytic diaphragm cells having a daily output capacity of five tons of caustic soda.

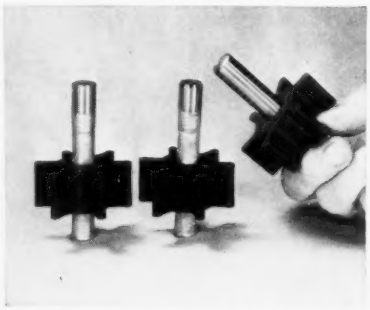
Bromine may also be produced. In the manufacture of common salt from sea water, a nearby factory discards thousands of tons of bromine-rich waste liquors. Engineers are considering the production of high-grade elemental bromine from these wastes.

Titanium Impeller Shaft Solves Corrosion Problem In Pumping Ferric Chloride

Impeller shafts of commercially pure titanium are now being used in pumps to carry ferric chloride solutions. They are reported to yield at least 320 hours of pump service without leakage. Materials tried previously — special ferrous and non-ferrous alloys, and platings of nickel, silver and rhodium — have given maximum service life of 45 minutes due to corrosion of the shaft and loss of tight seal.

The titanium impeller shaft was originally incorporated into a prototype pump unit and tested to solve a particular problem in the etching of printed circuits. It was found that the prototype unit would run for at least 321 hours without damage. And the initial cost of the special shaft was offset in the first 90 minutes of operation. The pump is now a regular production item.

Mallory-Sharon Titanium Corp., now affiliated with U.S.I. in the new Mallory-Sharon Metals Corp., participated in the original test runs by supplying the titanium.



At left are two impeller shafts which failed after 45 minutes of pumping ferrous chloride. Both are made of premium metals, one ferrous, one non-ferrous. At right is a titanium impeller shaft showing no sign of corrosion after two months in the same service.

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

Research reactors now in operation or being built in the U.S. are reviewed in a new booklet which can be purchased from gov't. Data and illustrations on over 30 reactors are included. **No. 1311**

A marking pen consisting of a heavy-wall polyethylene squeeze tube with felt writing point, filled with ink that writes on porous and non-porous surfaces, is now on the market. It is low-cost, disposable, comes in 7 colors. **No. 1312**

New fuel oil additives to prohibit gum formation in oil stocks are fatty amine derivatives claimed to also protect against color degradation and to improve filterability. **No. 1313**

Over 1,500 assayed biochemical compounds, along with their full specifications, are listed in a new reference guide for workers in bacteriological, nutritional, biological and microbiological research. Price list included. **No. 1314**

Three new hydrazine derivatives are available in lab quantities. Hydrazine dihydrochloride is suggested as a chlorine scavenger for hydrochloric acid, hydrazodicarbonamide as a chemical intermediate, monohydrazinium phosphate as an oxygen scavenger for boiler feed water. **No. 1315**

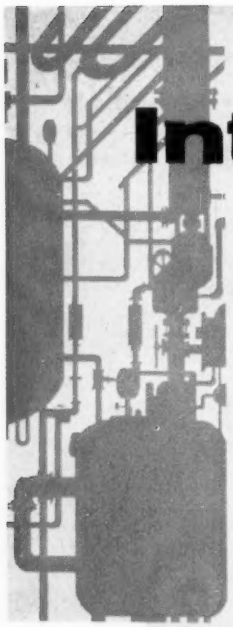
Analytical microscopy relative to foods, drugs, spices, water is discussed in a new book which can be purchased. The 215-page book describes preparation of materials for examination, gives examples of problem solutions. **No. 1316**

Isocinchomeronic acid, suggested intermediate for drugs, insecticides, polymers, dyes, is now offered commercially. Its ring-nitrogen is said to offer possible increased dye receptivity in polymer applications. **No. 1317**

Remote evaporation and drying by infrared radiation is now possible with a new heater for lab and semi-industrial use. Placed above a flat crucible, the radiator is claimed to evaporate without boiling or loss of material. **No. 1318**

New acid inhibitor has been developed which, it is said, can be used on high carbon steel without etching. It is used at about 0.2% by volume, added to non-oxidizing acids such as sulfuric, hydrochloric, hydrofluoric, oxalic. **No. 1319**

Molded polyethylene waste and drainage systems are now on the market. According to the manufacturer, traps, pipe, joints, fittings will withstand intermittent flushing with boiling water without deterioration or loss of form. **No. 1320**



Intermediates

ACETALDEHYDE AMMONIA
ACETOPHENONE
ACETYL CHLORIDE
ANISIC ALDEHYDE
ANISYL ACETONE
ANISYL ALCOHOL TECH.
ANISYL CHLORIDE
ANISYL CYANIDE
BENZALACETOPHENONE
BENZHYDROL
BENZHYRYLAMINE
BENZHYDRYL CHLORIDE
BENZOPHENONE TECH.
BENZYL ALCOHOL TECH.
BENZYL CYANIDE
BUTYROYL CHLORIDE
n-CAPROIC ACID
CAPROYL CHLORIDE
CAPRYLOYL CHLORIDE
p-CHLORBENZHYDRYL CHLORIDE
CINNAMOYL CHLORIDE
DIBENZYL ETHER
DICYCLOHEXYL CARBINOL
DICYCLOHEXYL KETONE
p, p'-DIMETHOXYBENZOPHENONE
DIPHENYL ACETONE (unsym)
DIPHENYL METHANE
ETHYL FORMATE TECH.
ETHYL PHENYLACETATE
beta IONONE
ISOBUTYROYL CHLORIDE
ISOVALERIC ACID
LAUROYL CHLORIDE
p-METHOXY PHENYLACETIC ACID
METHYL HEPTENONE
METHYL PHENYLACETATE
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PALMITOYL CHLORIDE
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PHENYLACETONE
PHENYLACETYL CHLORIDE
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n-VALERIC ACID
And Other Intermediates

1932

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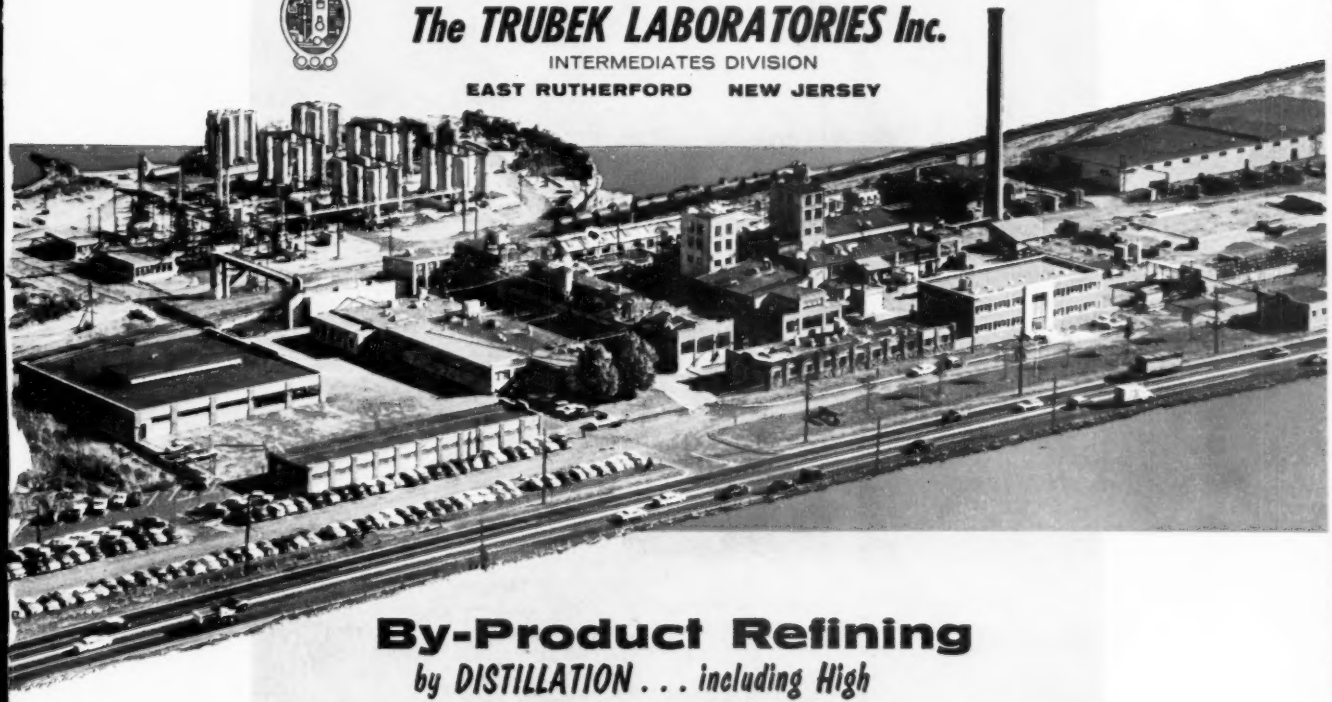

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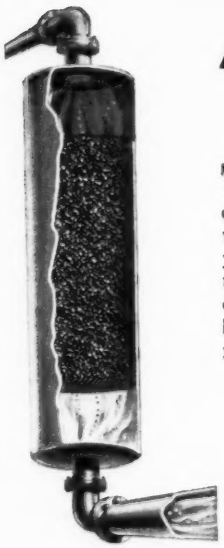

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OPINION

Natural-Gas Hydrogen

TO THE EDITOR: I noted with interest the article, "Coke Ovens Clean Up for New Competition" (*Dec. 14, '57*). The assumption that U. S. Steel will derive hydrogen from natural gas is quite correct. In fact we have completed building a hydrogen plant for this purpose. . . .

N. C. UPDEGRAFF
Sales Dept.
The Girdler Co.
Louisville, Ky.

Shake Hands at Chemshow

TO THE EDITOR: We were very happy to see a picture of our "friendly glove box" on your front cover (*Dec. 14, '57*). It was especially gratifying to us, since your headline [on the cover] was "550 companies vie for attention at biggest-yet Chemshow," and many companies went all-out for attention-creating gimmicks.

Pressurizing our glove box was an afterthought, and was not done until the second day of the show. It certainly worked out well for us, since many people, who ordinarily would have gone right on by our booth, stopped to "shake hands."

W. B. QUANTOCK
Advertising Manager
Kewaunee Mfg. Co.
Adrian, Mich.

Hooker at N. Vancouver

TO THE EDITOR: The Dec. 7 issue of CHEMICAL WEEK contains a Newsletter paragraph reading in part as follows: "A strike has forced Hooker to close its brand-new plant in North Burnaby, B.C. Walkout of pulp and paper workers in the area has so slashed the demand for chemicals produced by the plant . . . that Hooker has laid off 100 and shut its plant for the strike's duration."

First, the plant is located in North Vancouver, not North Burnaby. As to laying off 100, as of Nov. 30, our force account there numbered 93, consisting of 55 hourly paid and 38 monthly or weekly salaried employees. To date all salaried personnel have been working regularly, with some realignment of duties. The approximately 55 hourly workers worked full time at a reduced production rate from Nov. 14, when the pulp and paper industry province-wide strike began, until Dec. 2. Since then, they have worked approximately 2,000 manhours per week. In general, half of the hourly force works full time at full pay every other week; the other half works during the alternate week. During the week not worked, after the first week of layoff, each receives unemployment benefit of $30 per week if married or $23 per week if single. The "week-about" plan was recommended by the Unemployment Insurance Commission.

Our adoption of the plan is a sincere effort to provide jobs. We believe that we are building firm goodwill among our employees and in the community in benefiting those who otherwise would have been laid off under circumstances beyond their control. It does permit, however, concentration on important maintenance work done only when not producing chemicals, preparing surplus materials for sale and, in general, "getting our new home in order," normally spread over a long period. No demoralizing unproductive loafing is permitted, morale is relatively high, and our employees have evidenced their appreciation of our efforts to keep them employed. Undoubtedly, the holiday season was brighter as a result.

As to the plant's being "shut," while production of chlorine and caustic soda has been stopped, we continue to ship these chemicals to companies not affected by the strike. We continue to make and pipeline brine to the adjacent Electric Reduction Co., and also operate our boiler house for our own needs and for E.R. Co.

We sincerely hope that more drastic steps will not be required before the strike is over.

T. H. TRIMBLE
Manager of Public Relations
Hooker Electrochemical Co.
Niagara Falls, N.Y.

CW commends Hooker for its sympathetic handling of a trying situation.—ED.

CW welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible.

Address all correspondence to: H. C. E. Johnson, Chemical Week, 330 W. 42nd St., New York 36, N.Y.

MEETINGS

Plant Maintenance and Engineering Show, International Amphitheatre, Chicago, Jan. 27-30.

Society of Plastics Engineers, meeting on "Progress Through Plastics Engineering," Sheraton-Cadillac Hotel, Detroit, Jan. 28-31.

Instrument Society of America, chemical and petroleum instrumentation conference, Hotel Du Pont, Wilmington, Feb. 3-4.

International Management Division of American Management Assn., conference on effect of European common market on overseas operations, Biltmore Hotel, New York, Feb. 3-5.

Reinforced Plastics Division of Society of Plastics Industry, 13th annual technical and management conference, Edgewater Beach Hotel, Chicago, Feb. 4-6.

American Chemical Society, Philadelphia section, second Delaware Valley regional meeting, Sheraton Hotel, Philadelphia, Feb. 5.

Chemical Market Research Assn., joint meeting with **National Assn. of Purchasing Agents;** subject: economic projections; Sheraton-Park Hotel, Washington, Feb. 6.

National Society of Professional Engineers, spring meeting, Michigan State University, East Lansing, Mich., Feb. 13-15.

American Institute of Mining, Metallurgical and Petroleum Engineers, annual meeting, Hotel Statler and Hotel Sheraton-McAlpin, New York, Feb. 16-20.

Chemical Institute of Canada, 12th divisional conference, protective coatings subject division, Toronto, Feb. 20; Montreal, Feb. 21.

American Society of Mechanical Engineers, International Gas Turbine Power Division conference and exhibit, Shoreham Hotel, Washington, March 3-6.

Assn. of Consulting Chemists and Chemical Engineers. symposium and banquet, Shelburne Hotel, New York, March 5.

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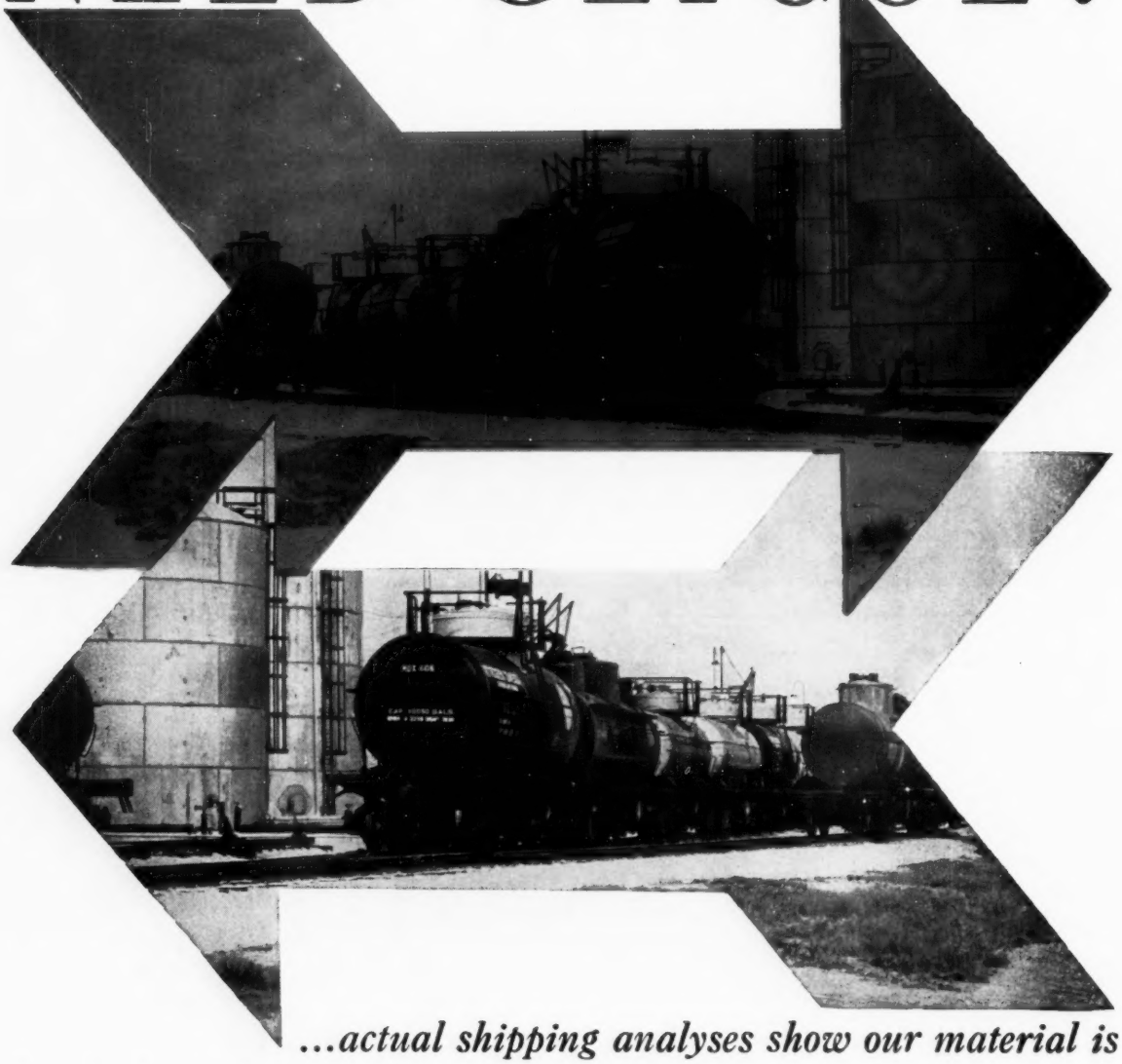

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Business
Newsletter

CHEMICAL WEEK
January 25, 1958

Chemical expansion news was rife last week (*see also pp. 32, 33*).

Biggest developments were in petrochemicals. As Shell Chemical Corp. prepared to start construction of acrolein and glycerine plants at Norco, La. (*CW Technology Newsletter, Jan. 18*), Humble Oil & Refining was starting up a new 30-million-gal./year high-purity benzene plant at its Baytown, Tex., refinery. Also, Humble will expand its *p*-xylene facilities to increase production to 66 million lbs./year.

Louisiana last week awarded $110.8 million in tax exemptions for chemical process industry expansion projects. Most of these projects had been previously announced by the involved companies. This list, by the state's Board of Commerce and Industry, includes: Crown Zellerbach Corp., St. Francisville, paper, $27.8 million; Wyandotte Chemicals, Geismar, chlorine, caustic soda and hydrogen, $18.25 million; Dow Chemical, Plaquemine, $11 million as last stage of $65-million chlorinated petrochemicals plant; Cities Service Refining Corp., Lake Charles, crude-oil refining, $4.2 million; Ethyl Corp., Baton Rouge, $3.8 million for vinyl chloride monomer plant and $2.7 million for ethyl chloride units; Kaiser Aluminum & Chemical Corp., Chalmette, alumina reduction, $1.7 million; and Bayou State Oil Co., Shreveport, lightweight aggregates, $300,000.

In most cases, these projects are well under way (*CW, Dec. 7, '57, p. 59*). Construction work at some sites was slowed by a labor dispute involving one of the building trades unions; but the process companies were still hoping for completion according to schedule. In particular, Wyadotte denied the report—recently printed in another publication—that it had ordered a stretch-out on its Geismar project.

The state board postponed action on a $4.3-million application by Freeport Sulphur Co. for new operations at Lake Pelto, off Terrebonne Parish. The board wants Freeport to work out an agreement with the tax assessor of that parish (county), who has expressed concern about the effect that such an exemption might have on the local economy.

And two new acid plants are in the works.

• Harshaw Chemical Co. is planning another major expansion in production of anhydrous hydrofluoric acid at its Cleveland plant.

• At Riverton, Wyo., Fremont Minerals, Inc., will construct a sulfuric acid unit at the site of its uranium processing mill, which is to be built this spring. The acid plant also will supply sulfuric for Freemont's uranium mill in Edgemont, S. D.

There's news, too, about overseas expansion of U. S. process companies.

• B. F. Goodrich Chemical Co .(Cleveland)—in partnership with Algemene Kunstzijde, N. V. (Arnhem, Holland)—is forming a new com-

pany to produce special-purpose synthetic rubber. The new plant—to be built at Arnhem, with completion scheduled for mid-'59—will be the first facility in continental Europe using Goodrich know-how to turn out such products as butadiene-styrene latexes, high-styrene reinforcing polymers, and Hycar nitrile latex.

• The Borden Co.—which has just reorganized its domestic chemical division (*p. 32*)—is planning to add two new units in Brazil: a 40-million-gal./year methanol plant, due onstream next January; and an additional formaldehyde plant, ready for startup, which will bring the company's capacity for that product in Brazil to 60 million lbs./year.

• W. R. Grace & Co., which recently announced a $50-million expansion plan for its papermaking operations in Latin America, has set up a new division to administer those plants: Grace Paper Co., with manufacturing and converting units in Brazil, Colombia, Mexico and Cuba.

But there was also a more somber side to the week's news.

Two plant explosions in widely separated areas brought employee casualties. One explosion and fire demolished two buildings of the United Rubber & Chemical Co. plant at Baytown, Tex., killing three employees and injuring three others. It was estimated that 25-30% of the $8-million rubber plant's facilities were destroyed, and that the plant might be out of production for several months. One possible explanation of the cause: butadiene gas might have backed up through the pipes from the reactor area.

The other blast was at Calvert City, Ky., where an electric-arc furnace exploded in the acetylene plant of Air Reduction's National Carbide Division. Five employees were injured. The plant's three other arc furnaces were undamaged.

•

A California jury last week ruled against Cutter Laboratories in the suit brought by two users of Cutter-made Salk polio vaccine (*CW, Business Newsletter, Nov. 30, '57*). The court directed Cutter to pay a total of $147,000 to the two plaintiffs, who were the first of more than 40 persons who have sued Cutter in connection with cases of polio that followed use of vaccine made by the company. Cutter will appeal the verdict; its appeal will press this point: Who's responsible for sickness or injury resulting from use of medicinal products made according to federal specifications?

The jury went out of its way to say that Cutter was not guilty of negligence in its production of the vaccine back in 1955. But it made its award on the ground that Cutter had failed to meet conditions of California's warranty laws. Ultimately, perhaps, the U. S. Supreme Court or Congress may have to decide this issue.

•

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Chemical Week

January 25, 1958

South of California's San Gabriel Mountains, Azusa lab will be base for chemical-aviation teamwork.

Pooling Rocket Resources for U. S. Security

Four chemical and aviation companies teamed up last week in two different joint ventures that hold promise of great technological advances and sizable cost-savings for the U.S. rocket, missile and statellite programs.

• Callery Chemical Co. (Pittsburgh) and Thiokol Chemical Corp. (Trenton, N. J.) entered into a working arrangement under which Callery will provide a new, high-energy solid fuel and Thiokol will develop "new, superefficient rocket engines."

• Stauffer Chemical Co. (New York) and Aerojet-General Corp. (Azusa, Calif.) signed a partnership agreement calling for establishment of Stauffer-Aerojet Co. Under this contract, the companies will "develop and produce boron compounds expected to be used widely as fuels for rocket, missile and airplane propulsion."

Also, Tennessee Gas Transmission Co. (Houston, Tex.) is in the process of acquiring an interest in Grand Central Rocket Co. (Redlands, Calif.). This would bolster the latter's competitive position in the race to develop and produce rocket propellents, give Tennessee Gas an entry into this field.

Two Precedents: These combinations come hard on the heels of the formation of Astrodyne, Inc., a jointly owned company set up two weeks ago by Phillips Petroleum Co. and North American Aviation, Inc. (*CW Business Newsletter, Jan. 18*). Purpose: to unite the parent companies' activities "in the vital and expanding field of solid propellents for rocket engines and aeronautical power units."

Pioneering in such teamwork: Olin Mathieson Chemical Corp., Reaction Motors, Inc. (RMI), and Marquardt Aircraft Co., which joined forces two and a half years ago in an integrated research attack on rocket and ramjet problems (*CW, Aug. 13, '55, p. 46*). (RMI is a joint venture of OM and Marquardt.)

Seeking new chemical fuels, Azusa researcher tests high-vacuum reaction.

These four alliances mean that RMI, Marquardt, North American, Thiokol and Aerojet—power-plant contractors for at least 26 of the 50 publicly announced missile and satellite projects of the Dept. of Defense—are now working in close harmony with the chemical industry's leaders in high-energy fuels research and development.

Switch to Solids: While all four partnerships involve boron-based fuels, it's significant that in at least two instances the swing is toward solids rather than liquid fuels.

Having developed a boron-based liquid fuel known as HiCal, Callery will now undertake "to provide HiCal in solid form and to work with Thiokol scientists in effecting a successful combination of compounds that can be utilized in Thiokol's case-bonded rocket-engine design." Also, Callery and Thiokol will try to develop what they describe as "more advanced solid oxidizers to further enhance the characteristics of this new solid fuel."

Since '52, Phillips has been conducting solid-propellent research, development and manufacturing for the Air Force at Air Force Plant 66 near McGregor, Tex., where Astrodyne will be located.

Spokesmen for Phillips Petroleum and North American say the new company's formation "will expedite research, development and manufacture of higher-energy solid fuels, propel-

lents and devices for use in rockets and missile systems."

And Olin Mathieson last week revealed that it's doing solid propellent research and development at its Ordill Works near Marion, Ill. The company recently bought a 500-acre site near Herrin, Ill., as a testing grounds for propellents that are made at Ordill.

Another Link-Up Pending: One other prospective link-up—still only in the negotiation stage—also seems to be related to advanced work on solid fuels. Hooker Electrochemical Co. (Niagara Falls, N. Y.) and Foote Mineral Co. (Philadelphia) are considering building a jointly owned plant to make missile fuel oxidizers based on perchlorates.

A.F.N. Inc., owned by American Potash, National Distillers, and Food Machinery and Chemical, is researching fuels at Henderson, Nev.

Stauffer-Aerojet will be based primarily at Azusa, where Aerojet has a laboratory (*photo, p. 29*) with "the largest chemical staff in the West devoted to rocket fuel research." Stauffer has extensive boron deposits, has more than 60 years' experience in mining and processing boron compounds.

Last year, Aerojet completed the country's first large-scale plant to make boron trichloride, a key intermediate in production of boron fuels.

Astrodyne will be staffed by Phillips' approximately 900 employees at McGregor plus an unspecified number of personnel to be transferred from North American's solid-propellent project. At McGregor, one major activity has been production of solid-propellent JATO (jet assistance take-off) engines. North American has been engaged in development and production of large liquid-propelled rocket engines since '46.

On Firm Foundations: In each case, the new partnerships appear to be solidly based on pooling relevant technology and production facilities.

Fruits of these joint efforts, aside from meeting pressing military security needs, may well extend a long way into peaceful applications. Board Chairmen K. S. Adams of Phillips and J. H. Kindelberger of North American have dedicated their new organization to "solving difficult technical problems in national defense as well as developing future civilian uses."

Mighty Role for Metals

Development of commercial and military applications of so-called "glamor metals"—in which chemical process companies are playing vital roles—is a key factor in national security and prosperity. This was the consensus at a forum last week sponsored by the Investment Analysts Society of Chicago.

Speakers' panel comprised four prominent figures in the metallurgical field: Frank Driggs, president, Fansteel Metallurgical Corp. (Chicago); Gunther Mohling, chief metallurgist, Allegheny Ludlum Steel Corp. (Pittsburgh); Bruce Old, vice-president, Arthur D. Little, Inc. (Cambridge, Mass.); Robert Parke, manager, materials application and evaluation section, Metallurgy and Ceramics Research Dept., General Electric Co. (Schenectady, N. Y.).

Old declared that continuing research in such metals as aluminum, columbium, lithium, magnesium, stainless steel, tantalum, titanium, uranium and zirconium "will yield developments beyond our wildest dreams."

Dual Defense Mission: "The importance of these metals to our nation is difficult to estimate," Old said. "If there ever is another war, it will be won by the country having the best heat-resistant metals." Such metals and alloys, of course, are essential in missile construction. The second way in which national security may hinge on these metals: a major portion of U.S. strength relative to other nations, Old asserted, centers around the peaceful and defense uses of atomic energy. But, he went on, people tend to forget that the key to progress in atomic energy is continued advancement in metallurgical technology.

Old told the brokers and investment analysts that columbium, on which the U.S. Dept. of Defense is sponsoring "a whole rash" of research projects, should have a particularly bright future. Predicting that the price of columbium will soon drop from its present level of about $55/lb., Old noted that production in the U.S. rose from only a few pounds in 1946 to about 10,000 lbs. one decade later.

Outlook for Uranium: Development of commercial atomic reactors, Old told the audience, depends on availability of uranium. Production of uranium oxide (U_3O_8) in 1957 was 9,000 tons, he calculated; but this required processing 22 million tons of ore.

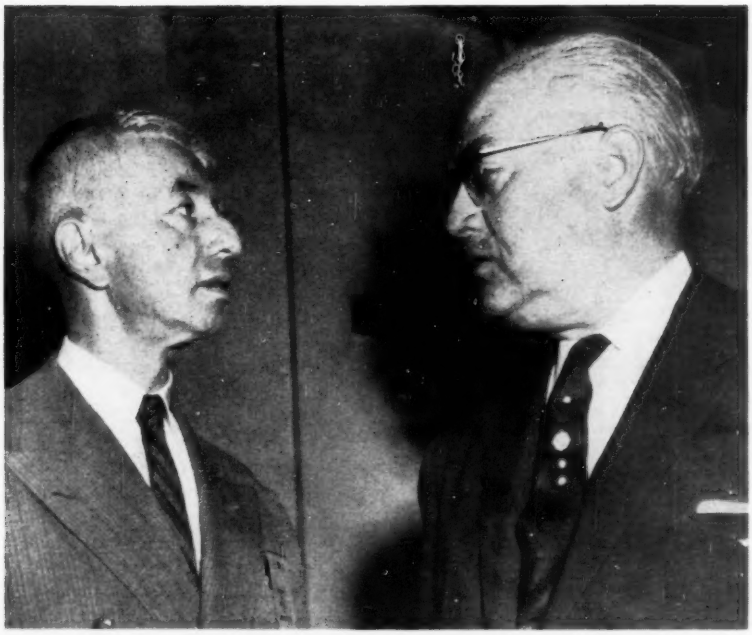
Parke said one of GE's current research projects relating to these newer metals is the commercial development of thermionic converters (*CW, Dec. 14, '57, p. 55*), which convert heat energy into electricity without use of moving parts. In a study of this principle in reverse, GE is working on production or absorption of heat, depending on the direction in which electric current flows through a junction of two dissimilar metals.

Soviet Russia, Parke added, is known to be using the thermionic principle in powering radios, and has refrigerators in operation using the second principle.

Fansteel's Driggs said more and more new applications of such metals are finding their way into industry. He cited use of tantalum in condensers, where the high capacitance of tantalum capacitors permits greater compactness (*CW Technology Newsletter, April 7, '56*).

As to rate of return on metallurgical research, Mohling reported that one-sixth of Allegheny Ludlum's 1956 sales derived from products that had not existed only five years earlier—a situation that is more common among chemical than among metal-producing firms.

A. D. Little's Old sees dual key to U.S. defense in 'glamor metals.'



In checkup on atomic progress, star witness and questioner*.

Brewing a New Atom Plan

New "ground rules" for companies taking part in the U.S. atomic energy program are in the offing as Congress prepares to audit a rising chorus of complaints and suggestions. And possible policy changes on subsidies, patents, security, and trade may make participation more inviting to the somewhat disenchanted chemical process industries.

The Joint Congressional Committee on Atomic Energy headed by Rep. Carl Durham (D., N.C.) has already heard complaints from scientific and industrial representatives; and on Feb. 3, its Research and Development Subcommittee will start two weeks of open hearings on progress in basic research in chemistry, metallurgy, and nuclear physics.

Following these hearings, the Atomic Energy Commission will present its annual report to Congress on the growth and state of the atomic energy program. Industry men will have the floor again Feb. 20-21.

Slow Mover: Current concern over the atomic energy program centers around the rate of power development. Four years ago, when the Atomic Energy Act set forth the atoms-for-peace program, optimism ran high about early development of commercial atomic power. In 1955 the Atomic Industrial Forum predicted the new source of energy would be competitive with conventional sources by 1964. Others predicted atom power generation would hit 135 million kw. or more by 1980. (Total U.S. electric power capacity today is 135 million kw. from all sources.)

But today, the tune is less cheerful. Currently, only two reactors are generating power for commercial lines—the 60,000-kw. Shippingport, Pa., government-owned reactor, and the 5,000-kw. Vallecito, Calif., reactor. Next year, a 22,000-kw. reactor is scheduled to go on the lines at Elk River, Minn. Four more power reactors are scheduled for startup in '60.

Cost Barrier: The biggest obstacle on the road to full commercial development of atomic energy is the cost obstacle. Utilities are very anxious to get onto the atomic scene before government ownership becomes a fixed pattern. But the cost is holding them off. Equipment manufacturers have also been stung and are growing more wary. General Electric, for example, has decided to enter no more fixed-price reactor contracts. On its Dresden reactor, built for Commonwealth Edison, GE is reported to have lost $15 million.

Another note in the mounting wave of coolness towards the atom was struck recently when Daystrom, Inc., dissolved its Nuclear Division and canceled plans to build a research reactor because funds were not forthcoming.

AEC bids for reactor construction have often been spurned because of fixed-price contracts, which industry representatives term "unworkable." Congress will shortly hear loud demands for increased government subsidization of commercial reactor development, greater assumption of research and development costs, guarantees against spiraling costs.

The snail's pace of the commercial reactor development program has crimped process company plans to expand in the nuclear field. Examples: In November, Sylvania-Corning Nuclear Corp. (Bayside, L.I.) scrapped plans for an "atomic center" (*CW, Nov. 16, p. 23*). And at its abuilding Montville, Conn., reactor core plant, Olin Mathieson is holding off on previously announced plans to add a larger plant.

No Despair: Despite frustrated expectations, most processors who are "in" on nuclear development have high hopes for the future. Firms operating AEC plants on a fee basis—like Union Carbide, National Lead, Du Pont, Allied and Mallinckrodt—are gaining some profit and a wealth of experience. As the variety of experimental reactors is checked out and reduced to fewer working types, costs should drop.

And great hopes lie in the future of industrial and chemical technology, much of which is still in the basic research stage.

Meanwhile, industry is pushing for greater standardization of parts design and a methods-engineering approach to reactor design; easier security and patent regulations; greater freedom for foreign trade.

Already, the AEC is acting on many of these complaints. And as industry speaks its mind before Congress next month, further spurs to nuclear progress seem likely.

*Left, Rear Admiral Hyman Rickover, chief of AEC's Naval Reactor Branch; right, Rep. Chet Holifield (D., Calif.), member of the joint committee on atomic energy.

At Waynesboro, $30-million Orlon addition nears completion.

Still Growing Strong

In the face of a deepening business downturn, Du Pont is still riding its expansion wave.

Latest plans center around construction of a diphenylamine plant at the firm's Gibbstown (N.J.) Repauno Works. The new aniline and diphenylamine facilities, due in operation in '60, will replace obsolete equipment. And for the first time at Repauno, Du Pont will produce hydrogen and anhydrous ammonia.

Du Pont plans to make its hydrogen for the anhydrous ammonia and aniline from natural gas. The ammonia will go into captive use, the aniline into the new diphenylamine process and for sale.

Orlon, Dacron, Polyethylene: Flouting a soft textile market, Du Pont is completing a $28-32-million addition to make Orlon at its plant in Waynesboro, Va., plans start-up by late spring. Meanwhile, at Old Hickory, Tenn., some 150 Du Pont engineers and technicians continue their year-long study of the feasibility of building a $20-million dacron plant and a $10-million dimethyl terephthalate (DMT) plant to replace its rayon works. Decision date: mid-'58. Overall, the plant now employs 2,000, after last year's layoff of 431.

Also up for decision: a linear polyethylene plant for La Place, La.

In another fiber expansion, a 40-million lbs./year nylon tire cord plant at Richmond, Va., is due onstream within the next few weeks.

By mid-'59, production of Delrin, Du Pont's new acetal resin, will begin at a Parkersburg (W. Va.) unit, now abuilding.

Cellophane, Silicon, Chlorine: Other Du Pont expansion plans include: a 50-million-lbs./year cellophane plant at Tecumseh, Kan., to start up next fall; a sodium and chlorine plant to go onstream late this year at Memphis; a silicon plant at Brevard, N.C., to start up this spring; and a sulfamic acid and Ammate weedkiller plant at East Chicago, Ind., due in May.

Coming up in the spring of '59: a 125-tons/day titanium dioxide plant near New Johnsonville, Tenn. Teflon output at Parkersburg is slated for a 40% boost, and Du Pont of Canada will spend some $7.5 million to expand its nylon plants in Kingston and Maitland, Ont.

Abroad, construction of a paint plant is under way in Cuba, slated for completion in Sept. and at Londonderry, Ireland, a neoprene plant is due onstream late in '59.

For Canadian 'Partners'

With its Canadian properties at the threshhold of what looks to be a long and profitable career, Jefferson Lake Sulphur Co. (New Orleans) is adopting a new tactic to keep from running afoul of the rising "economic nationalism" sentiment north of the border (*CW, Jan. 18, p. 48*).

Jefferson Lake President E. H. Walet, Jr., says his company will give Canadian investors a chance to buy stock in a new company—to be formed and based in Canada as a Canadian corporation—that will direct financing and development of Jefferson Lake's activities in that country.

Following "a comprehensive engineering study"—expected to be completed late this month by Parsons & Co. of California—Jefferson Lake and Gairdner & Co. (Toronto investment house) will announce details of the new venture.

So far, Jefferson Lake's Canadian assets include a sulfur recovery plant at Taylor Flats, B.C., onstream for more than two months; control of natural gas leases near North Calgary, Alta.; agreement with a Canadian pipeline concern for sale of that gas and for joint construction of gas processing and sulfur recovery plants at that field; and the Jefferson Lake Sulphur Co. of Canada, Ltd. (Vancouver, B.C.), set up to handle shipping and sale of sulfur produced in Canada.

Chemical Unit Boost

In recognition of its booming chemical sales, The Borden Co. (New York) has promoted its chemical division to company status. New name: The Borden Chemical Co., Division of The Borden Co.

The big dairy firm's chemical sales and profits have been growing by more than 25%/year for the past three years, hit nearly $50 million last year. "We expect the same rate of increase both for sales and profits for '58." Division President Augustine Marusi tells *CW*, "The 'recession' hasn't affected our plans at all."

Borden's chemical production—in 17 U.S. and 11 foreign plants—includes casein (48% of world output), phenol-formaldehyde, resorcinol-formaldehyde adhesives, formaldehyde, polyvinyl chloride, other resins.

COMPANIES

Lithium Corp. of America (Minneapolis) now claims to be supplying 90% of the lithium used in production of high-energy fuels at Olin Mathieson Chemical Corp. plants at Niagara Falls, N. Y.

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Arapahoe Chemicals, Inc. (Boulder, Colo.) has absorbed its former subsidiary, Arapahoe Special Products, Inc., "for purposes of internal and external simplification." Products made by the five-year-old company: Grignard reagents, and chemicals made by Grignard and similar reactions.

•

Mandrel Industries, Inc. (Houston, Texas) has received the California state corporate commissioner's approval to submit to stockholders of Sequoia Process Co. (Redwood City, Calif.) its proposal for acquisition of the latter concern (*CW Business Newsletter, Dec. 14*). Early indications were that Sequoia stockholders —who have until Jan. 31 to make their decision—will accept Mandrel's offer.

EXPANSION

Plutonium: The Atomic Energy Commission plans to spend about $25 million for construction and engineering projects at its Hanford Works (Hanford, Wash.) during calendar year 1958. Expenditures will include some $6 million for the plutonium recycle test reactor, $2 million for fabrication pilot plant, $3 million for development and study of a plutonium production reactor, and $13 million for various plant improvement projects. It spent $23 million for expansion in '57.

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Phosphorus Products: Dominion Fertilizers Ltd.—a recently formed Canadian concern in which the principal interest is owned by Fertilizer Corp. of America (New York)—will build a plant to make powdered and granulated superphosphate on a 22-acre site at Port Maitland, Ont. The plant will have deep-water access to Lake Erie, also may produce wet-process phosphoric acid and derivatives.

Nearby, Electric Reduction Co. of Canada is building a $5-million electrothermal phosphoric acid plant.

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Pulp and Paper: Three companies are at various stages of increasing their pulp and paper capacity in Canada.

• Crown Zellerbach Corp. has worked out a long-range plan—subject to approval by the Newfoundland provincial assembly—to extend its operations into eastern Canada. If the proposal is approved, CZ will decide whether to build a newsprint mill (200 tons/day, later to be expanded to at least 400 tons/day) and a pulp mill (500 tons/day, ultimately to be expanded to 2,000 tons/day). Raw material would come from 99-year renewable leases on government-owned timberlands in southeastern Labrador and eastern Newfoundland.

• Also in Newfoundland, Bowater's Newfoundland Pulp & Paper Mills Ltd. is increasing capacity of its newsprint mill at Corner Brook to 1,100 tons/day.

• In western Canada, B. C., Forest Products Ltd. is making final alterations in its $46-million bleached sulfate pulp mill at Crofton, B.C., preparatory to full production this spring.

FOREIGN

Petroleum Products/Finland: Neste Oy, Finland's first petroleum refinery, is onstream at Naantali, near the port of Turku, in southwestern Finland. Designed and engineered by The Lummus Co. (New York) and its European subsidiaries, this installation, world's northernmost refinery, is designed to handle a mixture of 18,500 bbls./day of Middle East and Russian crude oil or 19,200 bbls./day of Russian crude alone. So far, it has been operating at up to 115% of capacity, producing gasoline, fuel oil, LPG and asphalt products. Intended to supply about half of Finland's requirements for petroleum products, the plant is said to be the first complete refinery in Europe to have a fully electronic instrument control system.

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Chemicals/East Europe: The Communist countries of eastern Europe have agreed on plans to coordinate development of their chemical industries. The program will cover research and production in mineral fertilizers, synthetic fibers, organic dyes, paint, varnish and synthetic rubber.

One early example: cooperation between chemical industry organizations in Poland and East Germany. East Germany will help Poland produce potash; Poland will ship coal-tar products and phosphorus ores to East Germany; East Germany will supply technical information on nitric acid production, natural gas processing, and plastics production; and Poland will supply new processes for production of latex, melamine resins, phthalic acid and other chemicals.

Russia has loaned $75 million to Hungary for modernization of its chemical, oil, paper, textile, foundry and building materials industries. Also, Russia is believed to have helped construct Hungary's "medium sized" atom reactor, which is to go critical this summer.

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Chemicals/India: Tata Chemicals (Mithapur, Bombay) is negotiating a $1.26-million loan from the International Finance Corp. (Washington, D. C.) to double its soda ash capacity to 400 tons/day. Over-all, the company's 1958-61 expansion program will cost an estimated $9.5 million and will boost production of caustic soda, chlorine, zinc chloride, sodium and ammonium bromide, epsom salts, hydrochloric acid and bleaching powder.

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Washington
Newsletter

CHEMICAL WEEK
January 25, 1958

Protectionist sentiment in Congress is becoming more vocal. Spokesmen for domestic CPI companies desiring additional tariff and quota relief from foreign import competition are talking tougher than ever.

The prime drive is for a concerted legislative attack with congressmen from protectionist-minded areas getting together to force through amendments to the Administration's legislation extending the basic Reciprocal Trade Agreements Act. These amendments would provide more and easier tariff and quota barriers. Failing that, protectionists will try to defeat the trade law itself. They claim they can do it. Congressional staffers are working on new legislation to introduce in event of a void. A sweeping new role for the Tariff Commission is one alternative; under this plan, Tariff would come under direct Congressional control with authority to set and regulate all export-import trade. Its authority would be subject only to a White House veto, which—to stick—would have to be sustained by both houses of Congress.

White House and State advisers are more fearful of amendments than they are of the possible threatened defeat of the whole reciprocal trade bill. They admit they are in for a tough fight. But they think opponents are overstating their strength in the hope of making a straight one-year extension of the law, with at least some restrictive amendments, look like a gift from heaven.

Tariffs on foreign copper ores and concentrates are likely to be reapplied this year. Currently under a total suspension, which runs out next June 30, the present rate is 1.8¢/lb. Next year, the tariff would automatically be reapplied at the lower negotiated rate of 1.7¢ unless specifically suspended again by Congress. No additional suspension is likely in light of rising protectionist strength in Congress.

Last week, Sen. James Murray (D., Mont.), chairman of the Interior Committee, was joined by 11 other senators and 14 representatives in sponsoring new legislation that would raise the current peril point on copper from 24¢ to 30¢/lb. Below 30¢, a 4¢ duty would apply to all copper imports. Domestic copper producers may not win their fight for a 6¢ increase in the peril point or a 2.3¢ duty boost. But a higher compromise is likely.

Here's why the Administration thinks a business boost is sure to come sometime this year:

- Increased defense spending is biggest basis for White House confidence (amount of the increase: $1 billion).
- State and local government spending is expected to be up $3 billion over last year.
- Easier credit policies will give business a lift.

Washington Newsletter

(Continued)

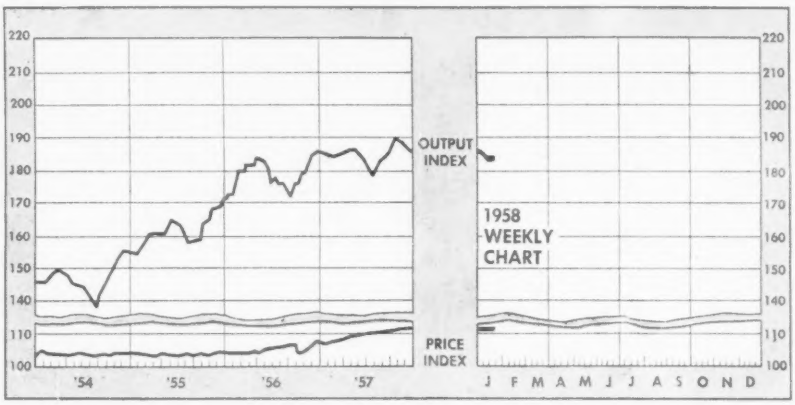
• New stimulation to housing through easier insured mortgages.

• Industry investment in plant and equipment, though down from last year, is still at a high level.

Two recent moves show the Administration is acute to the anti-recession problem: the Federal Reserve's lowering of margin requirements on stock purchases—from 70% to 50%—should help to boost stock market activity and prices. Perhaps a more solid psychological boost to business confidence was Eisenhower's news conference declaration that he would prefer to have some deficit financing rather than raise taxes.

Eisenhower proposes more than 40 pieces of legislation in his economic report. Many of these are recommendations he has made before —but the new urge to stop the economic decline may help to get them passed this year.

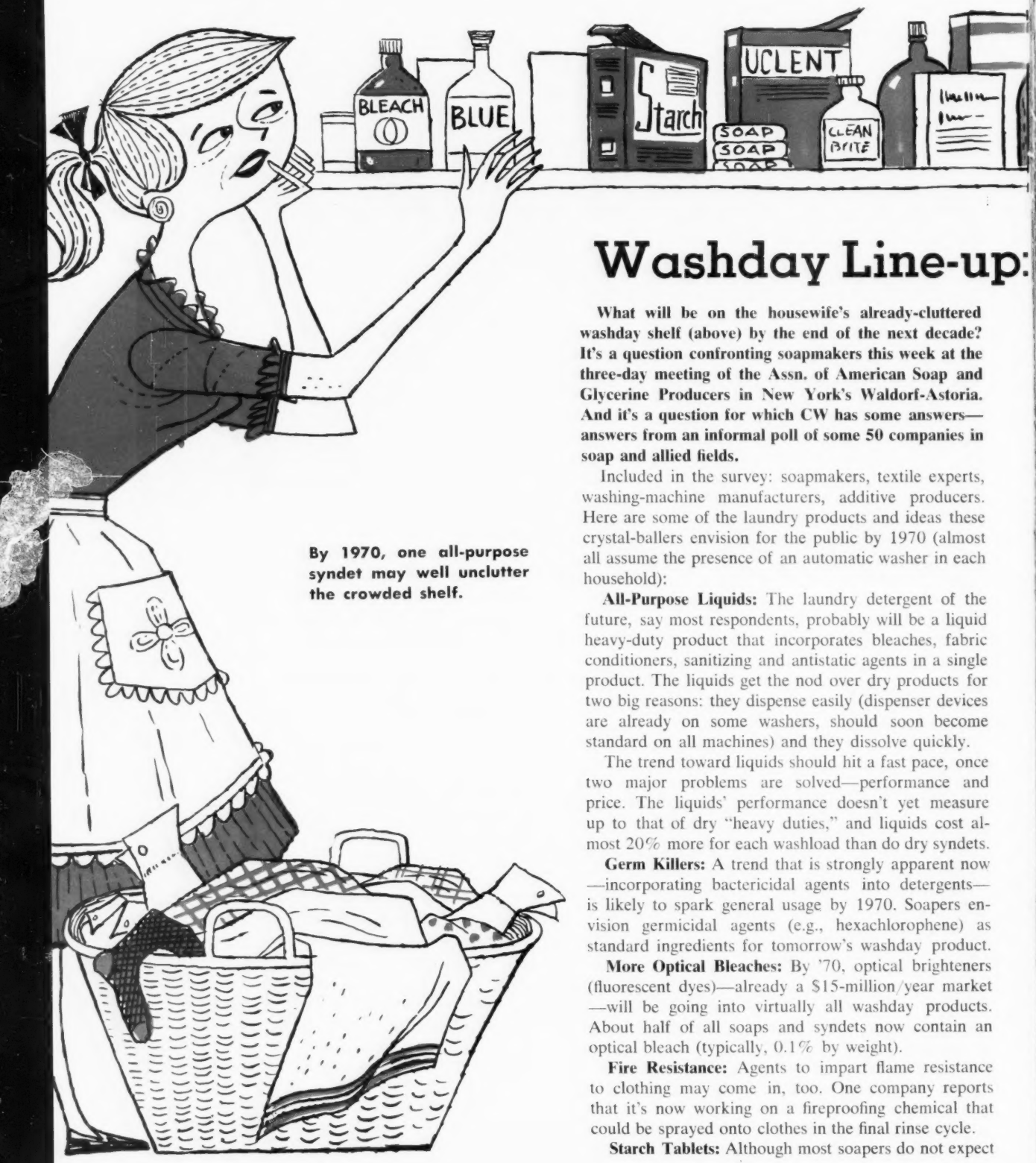
Among the measures that Congress is asked to approve is an extension of the existing corporate tax rate, five credit measures leaning toward easing money, the $250-million/year science-education program, a better break on amortization for purchasers of used machinery, simplified SEC rules on security issues up to $500,000, antitrust and small-business legislation, welfare and union regulation proposals, the foreign aid and reciprocal trade program, and proposals to bolster some shaky federal statistics on construction and the like.



Business Indicators

WEEKLY	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1947-49=100)	186.0	184.0	186.5
Chemical Week wholesale price index (1947=100)	111.2	111.1	106.9
Stock price index of 11 Chemical Companies (Standard & Poor's Corp.)	40.51	40.26	47.10

MONTHLY Trade (million dollars)	Manufacturers' Sales			Manufacturers' Inventories		
	Latest Month	Preceding Month	Year Ago	Latest Month	Preceding Month	Year Ago
All manufacturing	27,386	28,064	28,480	53,797	54,103	52,210
Chemicals and allied products	1,945	2,002	1,940	3,739	3,732	3,582
Petroleum and coal products	2,787	2,895	2,763	3,659	3,623	3,188



By 1970, one all-purpose syndet may well unclutter the crowded shelf.

Washday Line-up:

What will be on the housewife's already-cluttered washday shelf (above) by the end of the next decade? It's a question confronting soapmakers this week at the three-day meeting of the Assn. of American Soap and Glycerine Producers in New York's Waldorf-Astoria. And it's a question for which CW has some answers—answers from an informal poll of some 50 companies in soap and allied fields.

Included in the survey: soapmakers, textile experts, washing-machine manufacturers, additive producers. Here are some of the laundry products and ideas these crystal-ballers envision for the public by 1970 (almost all assume the presence of an automatic washer in each household):

All-Purpose Liquids: The laundry detergent of the future, say most respondents, probably will be a liquid heavy-duty product that incorporates bleaches, fabric conditioners, sanitizing and antistatic agents in a single product. The liquids get the nod over dry products for two big reasons: they dispense easily (dispenser devices are already on some washers, should soon become standard on all machines) and they dissolve quickly.

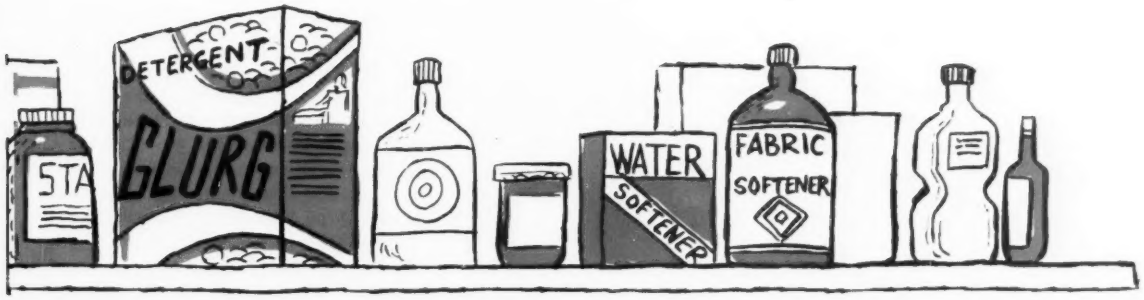
The trend toward liquids should hit a fast pace, once two major problems are solved—performance and price. The liquids' performance doesn't yet measure up to that of dry "heavy duties," and liquids cost almost 20% more for each washload than do dry syndets.

Germ Killers: A trend that is strongly apparent now—incorporating bactericidal agents into detergents—is likely to spark general usage by 1970. Soapers envision germicidal agents (e.g., hexachlorophene) as standard ingredients for tomorrow's washday product.

More Optical Bleaches: By '70, optical brighteners (fluorescent dyes)—already a $15-million/year market—will be going into virtually all washday products. About half of all soaps and syndets now contain an optical bleach (typically, 0.1% by weight).

Fire Resistance: Agents to impart flame resistance to clothing may come in, too. One company reports that it's now working on a fireproofing chemical that could be sprayed onto clothes in the final rinse cycle.

Starch Tablets: Although most soapers do not expect



What Will Be on the Shelf in 1970?

tablet detergents by '70, starch makers take an opposite view—believe that starch in tablet form will be marketed by that time.

The starch tablet, designed for automatic dispensing, would be added near the end of the washing cycle. And it would do far more than add body and stiffness, as do current products. It may replace or repel the water from the fabric surface and from between the fibers. Clothes would come out of the washer practically dry. Since there will still be a large variety of fabrics in '70, starches probably will not be incorporated into detergents.

Cleaning with Gas: One detergent maker advanced this idea: tomorrow's detergent may be a gas. It would be dispensed from a central point in the community, piped directly into the automatic washer and be billed much the way telephone service is billed. Designed for cold-water washing, the gas detergent would be made to meet water hardness problems in various areas.

Detergent via Spigots: The basic idea of centrally dispensed gas detergents could apply to liquids as well. Although laundry experts don't support the idea of a city-distributed product, they do see some merit in a centralized supply for, say, an apartment house (for individual homes, the cost would be prohibitive). The spigot for syndet might be added to hot- and cold-water panels in kitchen, bathroom and laundry room. A three-sectioned tank, containing laundry, dish-washing and toilet syndet in liquid form, would dispense the correct syndet upon opening the appropriate valve.

The Detergent Man: Another plan that would speed the disappearance of the detergent counter in supermarkets is door-to-door delivery. One company reportedly has been trying to arrange to have milkmen also deliver gallon-size containers of liquid detergent each Monday morning.

Upgraded Machines: Not only will tomorrow's all-purpose laundry detergent be designed for faster, more complete cleaning action; washing machines will also be faster and more effective. The entire washday procedure will take only 15 minutes. Tomorrow's home laundry, machine makers report, will consist of a single combination washer-dryer that will automatically dispense the all-purpose detergent and starch.*

A few manufacturers predict that tomorrow's prewired and portable washer (probably made of glass or plastic) will do a complete, month's washing using the same water (the water would be filtered and reused through recovery units). Cold-water washing, already a feature of 12 automatic washers, will be even more prominent in '70.

Ultrasonic washers for household use (washers that remove dirt by sound waves, generally above a frequency of 20,000 cycles/second) have lost much of their original appeal. But machine makers haven't completely given up on the idea. Westinghouse says that "at the present time, ultrasonic washers aren't economically practical, but it certainly is reasonable to expect some new washing principle by '70 that will supplement present agitation methods, if not completely replace them."

Perhaps the development that will have the greatest impact on the laundry industry will be the evolution of synthetic fibers and chemical fiber coatings that will markedly reduce soiling and eliminate ironing. Du Pont reports that "by '70, soil-resistant, bacterial-resistant and completely wrinkleproof fabrics will be available." Fabrics will be lighter in weight, ironing and pressing will virtually be a thing of the past.

Disappearing Dry-Cleaner: Syndet makers predict that "as domestic cleaning becomes more efficient and easier, commercial laundries will be on their way out." This would affect dry cleaners as well as commercial laundries. Says one large detergent maker: "Dry cleaning as we know it today will have disappeared by '70 because practically every clothing item—even winter coats—will be washed at home."

Throwaway Clothes: Helping reduce the volume of washday clothes, will be paper and plastic single-wear

*Sales of combination washer-dryer units in '57 totaled 187,000. Hotpoint's 10-year forecast is that by '67 factory shipments of combination washer-dryer units will have climbed to 1,900,000 units, automatic and semiautomatic washers to 4,100,000 units (2,865,000 washers were sold in '57), and electric dryers to 1,925,000 units (923,600 electric dryers were sold in '57). Within the next 10 years, Hotpoint predicts, industry will ship 38 million automatic and semiautomatic washers, 16 million electric dryers, 10.3 million combination washer-dryers.

No washing disposable clothes?

garments. But because the form and texture of outside garments are dictated more by fashion than by technology, fabric makers don't expect to see disposable garments other than heavy work clothes, underwear lines and in childrens' play clothes.

Softer Water: In homes, the use of tank-type water softeners will expand greatly with the development of automatic means of regeneration. Demineralizers are now being used in special industries. By '70, they'll be a common item for clothes and dishwashing purposes.

Though municipal hardness-reduction units are likely to be a common thing in the future, public water supplies should not change appreciably within the next 15 years. One big problem: finding enough fresh water for home and industrial consumption. Purification of sea water, perhaps by atomic energy, may provide ample source.

Fifty-Year Vision: Although clothes will probably be washed in water 15 years from now, washing in water may become obsolete within the next 50 years. One detergent supplier says: "I visualize the ultimate departure from laundering in water systems. We may beat the growing fresh-water shortage by atomic-powered, sea-water conversion systems But we will have heavier-burdened sewage disposal systems, and it probably will be more practical to launder in hydrocarbon solvent systems, with an economical recovery system in each home."

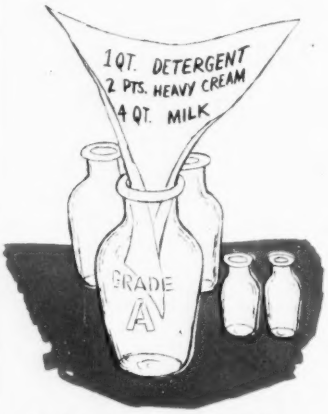
As far-fetched as some of these ideas appear to be, they seem almost conservative compared with ideas voiced at the 41st annual meeting of the American Home Laundry Manufacturers' Assn. at French Lick, Ind., last spring. Some possibilities for the future:

- A pill, taken internally, that would cause a person to perspire a cleaning solvent.

Gas cylinder instead of syndet box?

- Detergents built into clothes.
- A detergent that would react so violently with water that it would eliminate the need for a washer-agitator.
- A gas chamber through which a person could walk and have his clothes cleaned while being worn.
- A detergent (and germicides) that would be incorporated into the finish of the machine.
- Radioactive tags built into fabrics to activate the proper dispensing devices of the washer.
- A starchlike chemical that would be incorporated into the detergent to give clothes an ironed look on exposure to heat.
- Detergents containing cosmetic-type materials that would therapeutically treat clothes while being worn.
- Materials that would strengthen rather than weaken fibers in each succeeding wash.
- Machines that would contain a permanent supply of reusable water (or solvent).

It's anybody's guess as to which of these developments will actually



Syndets via the milkman?

come about. But it's almost certain that changes will come faster than most people think. If soaps could be replaced by syndets in the relatively short time that they were, there's no reason why the present products couldn't be superseded just as quickly. Today's washing materials are good, but apparently won't be good enough for tomorrow's housewife.

Surprises from Colgate

Colgate-Palmolive is the front-runner in two important specialty developments.

• The company is well along in its production of an aerosol toothpaste and will probably be the first to get that type of product on the market on a national scale. Simply tagged Colgate's Aerosol Toothpaste, and packed in a red-and-white can, it will carry a 97¢/8 oz. retail tag. It is due in stores within a month, will be splashed country-wide without test-marketing.

• Already in dealers' displays is a new formulation of Colgate's Fab detergent, containing G-11 (hexachlorophene). The company hasn't yet given this development much publicity. Trade observers, however, point out that in light of the additive's high price ($1.95/lb.), the company will likely try to get as much sales mileage from it as possible. They figure Colgate will soon loose its promotion of the hexachlorophene—the now-appearing ads for Fab don't mention it, make only some vague claims for the product's Duratex additive.

Colgate is apparently the first of the big soapmakers to use G-11 in a laundry product for home use. Others (e.g., Purex and Armour) have used the material in laundry soaps and detergents sold for hospital use, and it is, of course, widely used in toilet soaps. Whether the use of a bacteriostat such as G-11 becomes common practice probably will depend on whether U.S. housewives take to the new Fab. Formulations require up to 2% of the material to gain a lasting bactericidal effect, and that could add as much as 5¢/box to the U.S. laundry product bill—currently $750 million at makers' level.

There are, certainly, other available germ-killing additives, and it's possible a soaper could get a similar effect from a chlorine-releasing agent such

as dichlorocyanuric acid. Making the housewife germ-conscious seems sure to be the next big push for the soapers —and the trend that will trigger big sales for suppliers of germ killers.

PRODUCTS

Synthetic Oil: A synthetic fatty-type oil, Smithol 25, has been developed by Werner G. Smith Inc. (Cleveland) for many jobs now filled by sperm oil. The new material has a pour point of —16 F, and a very high viscosity index (92.8 SSU at 100 F and 42.1 SSU at 210 F. It's said to resemble sperm oil in appearance and feel, but hasn't its odor; it has an iodine number of 105 and produces light-colored sulfonated oils. It's said to be easily sulfonated, sulfurized or chlorinated without forming gums or sediment. Suggested applications: sulfurized lubricant bases, lubricant bases, sulfonated oils, cosmetics, cutting oils, wool oils and textile lubricants.

Dry Run: Philadelphia Quartz Co. (Philadelphia) now offers its Kasil potassium silicate available in anhydrous form. The anhydrous solid potassium silicate in lumps has a percentage ratio of 1:2.50 with a 28.4% K_2O and 71.0% SiO_2. The material is also produced as a fine powder, sizing approximately 50% between 64-200 mesh and the balance through 200 mesh. Suggested uses for the anhydrous potassium silicates: welding-rod coatings, refractory cements, ceramic coatings, enamel frits, catalysts, liquid detergents.

•

Best-Selling Color: According to the latest Colortrend Report, released by California Ink Co., a turquoise known as "pinefrost" is its No. 1 color in the U. S. today. The report is based on sales of refill orders for tubed colorants from some 12,000 U. S. paint dealers. It shows that for the last half of '57, light browns, off-whites, some yellows and "Dresden Blue" gained

Blending Gun Speeds Resin Spraying

Producers of specialty resins are now studying a tool for production of glass-fiber laminates. Developed by Rand Development Corp. (Cleveland), the new Rand Fiber-Resin Depositor is a three-way gun. It sprays activated resin and chopped glass-fiber strands simultaneously at rates that produce up to 15 lbs./minute high-strength laminate. Three streams, two of resin and one of glass-fiber are blended outside the gun in mid-air and allow laminate to be deposited on a mold with a minimum of trapped air. The gun weighs 9 lbs., operates on 110-ac. current and compressed air, and can be easily handled by one man. Rand says the process provides cost reductions of 40% over older methods, is licensing it on a royalty basis.

At the hub of major rail, water and truck routes, the new Texaco Lockport plant serves many industries: Refrigeration, metal working and refining, explosives, plastics, textiles and dyeing, petroleum refining, and pulp and paper.

TEXACO LOCKPORT (ILL.) AMMONIA PLANT NOW MAKING DELIVERIES

Orders for anhydrous ammonia are mounting. The advantages of doing business with Texaco Lockport are compelling:

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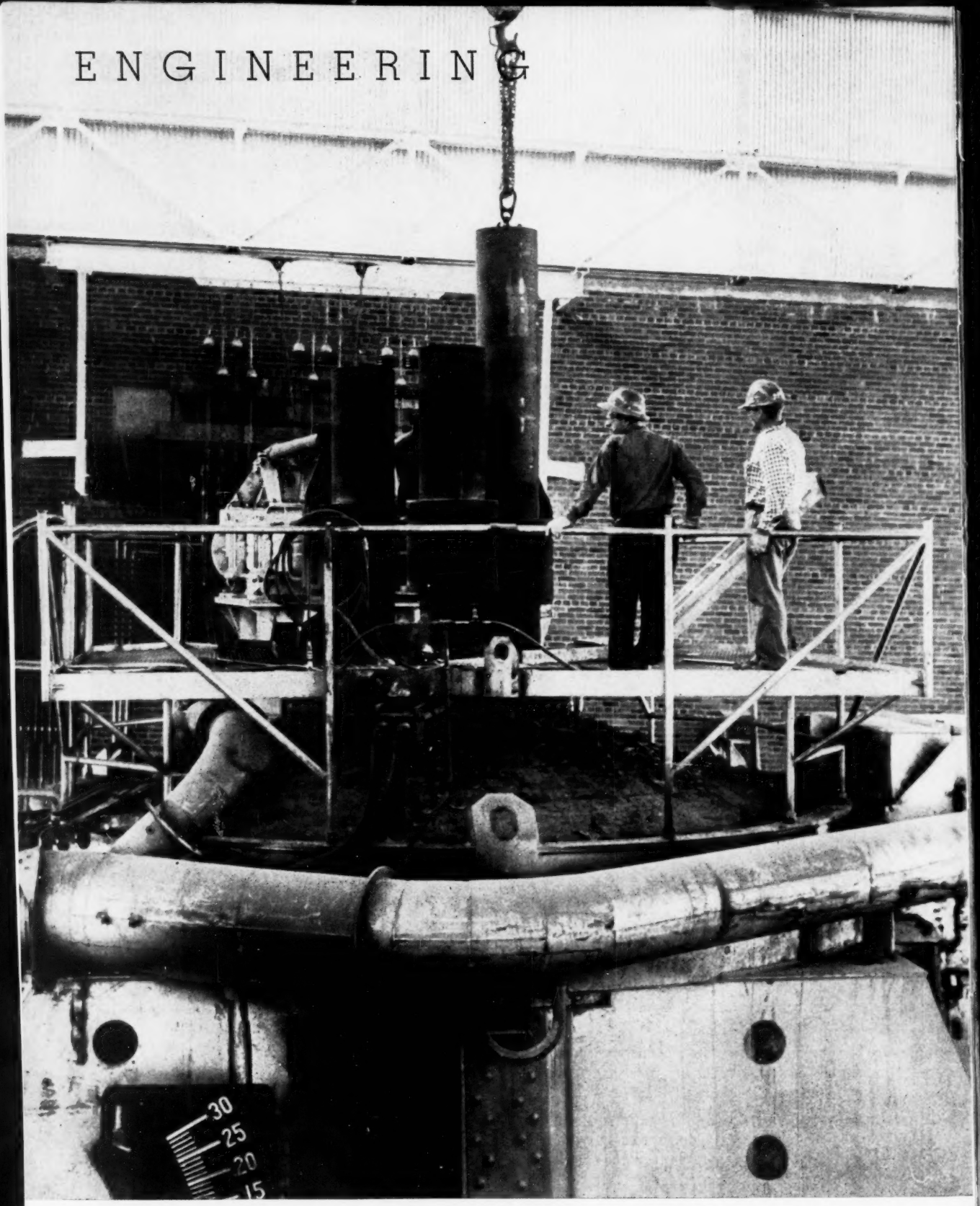
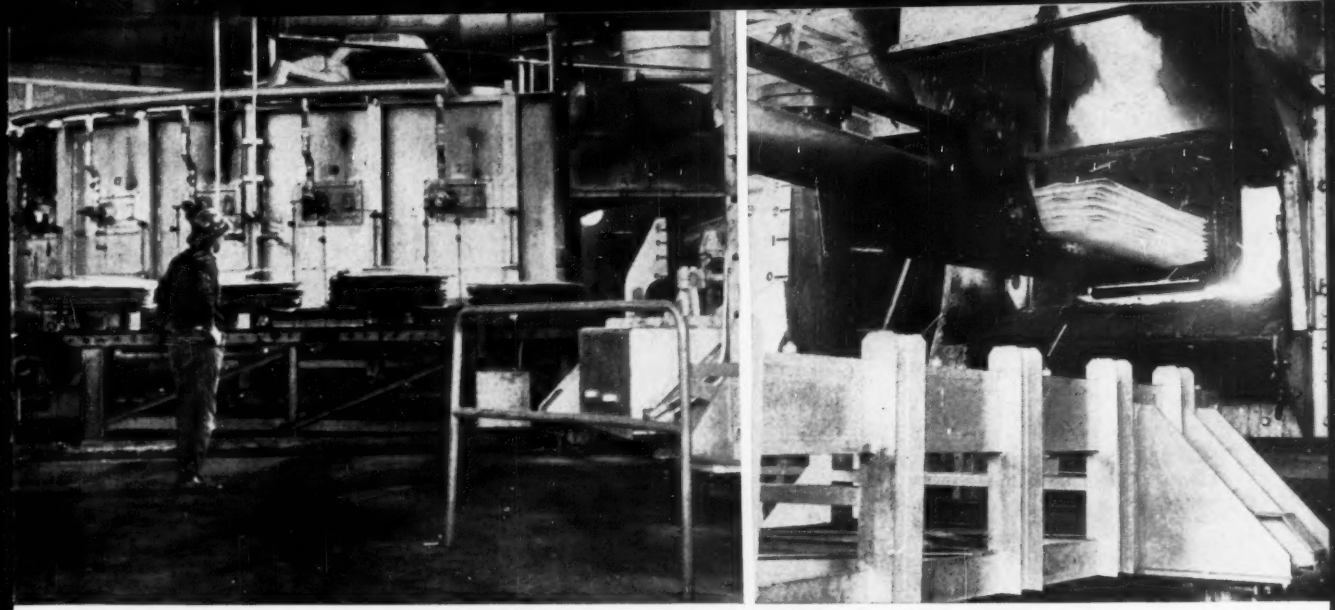
ENGINEERING



Electrode control system atop Asarco's new copper melter maintains optimum arc-melting operation.



Oil-fired furnace (left) preheats copper fed to arc furnace (right) for maximum heat efficiency.

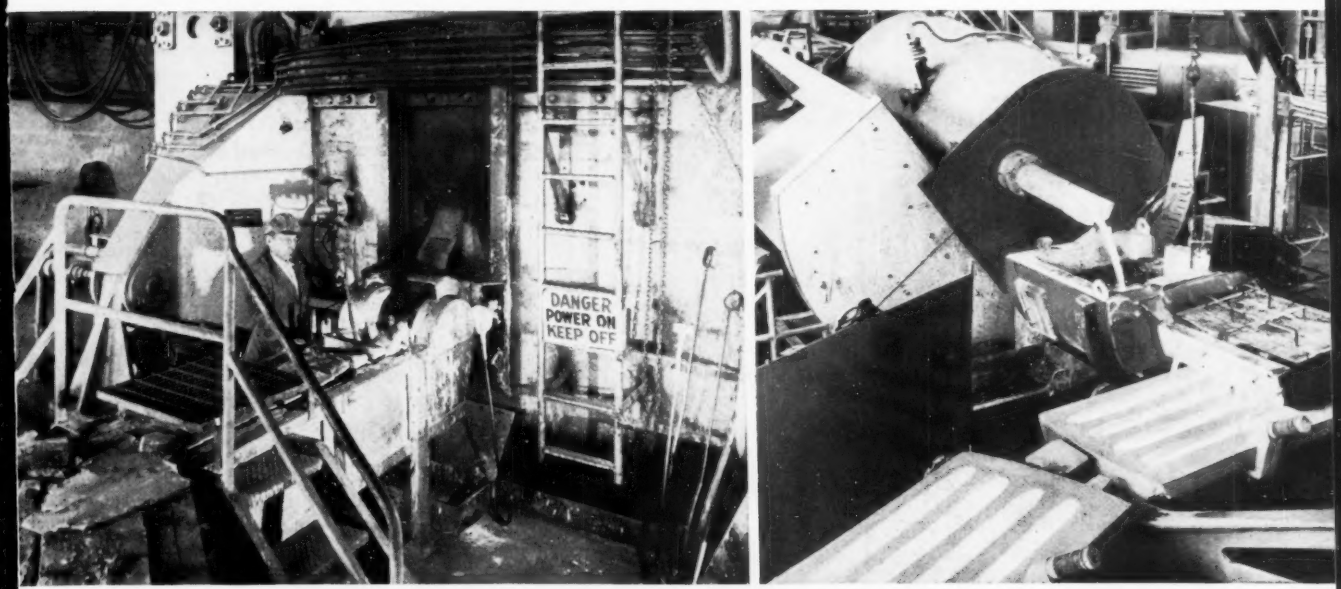
Now Arc-Melting Pays Its Way in Copper

At Perth Amboy, N.J., this week, American Smelting and Refining Co. is proving the electric-arc furnace's ability to compete with reverberatory furnaces in the production of high-quality, tough pitch copper.

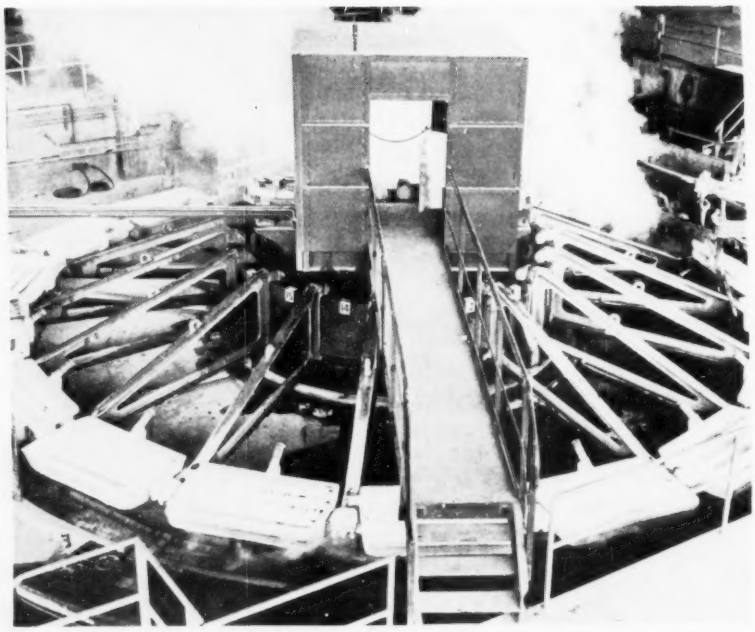
This is particularly significant because Asarco's new installation—the world's largest copper-smelting electric furnace—is doing the job economically on high-cost electrical power (about 1¢/kwh.), though there's no scarcity of reasonably priced conventional fuel in the area of the plant.

The secret of Asarco's success under apparently unfavorable economic conditions lies in its unique one-two combination of conventional fuel and electric power: it uses (1) an oil-fired furnace to preheat electrolytically refined copper cathodes; (2) electric-arc furnace to melt the metal and heat it to casting temperature. Result: optimum thermal efficiency of both those types of energy inputs.

But economically competitive operation isn't the only cost advantage afforded by the electric-arc melting system. It also boasts a lower capital cost than multiple reverberatory furnace installations of the same yearly capacity. And because it is a continuous process, electric-arc melting is more flexible than batch-melting in reverberatory furnaces. Casting operations are simplified, too.



Molten copper is sampled (left), flows through launder to holding furnace and casting ladle (right).



Copper cools as casting wheel carries molds through water sprays.

Close Control: Asarco started six years ago to review existing copper arc furnaces. Object: to obtain maximum flexibility and precise control of copper-melting operations. The keys to maximum efficiency, it decided, were improved power-input control and electrical stability. Engineers from Whiting Corp. and General Electric cooperated with Asarco designers, conducted analog computer studies of the process control system.

Results of preconstruction test runs on the computer indicated that fast, highly responsive repositioning of furnace electrodes to maintain the proper arc spacing is vital. The arc discharges from the bottom of the electrodes to the molten bath, and requires accurate maintenance of a ½- to 1-in. air gap at all times. If electrodes are lowered too far, a short circuit results; if withdrawn excessively, the arc is snuffed.

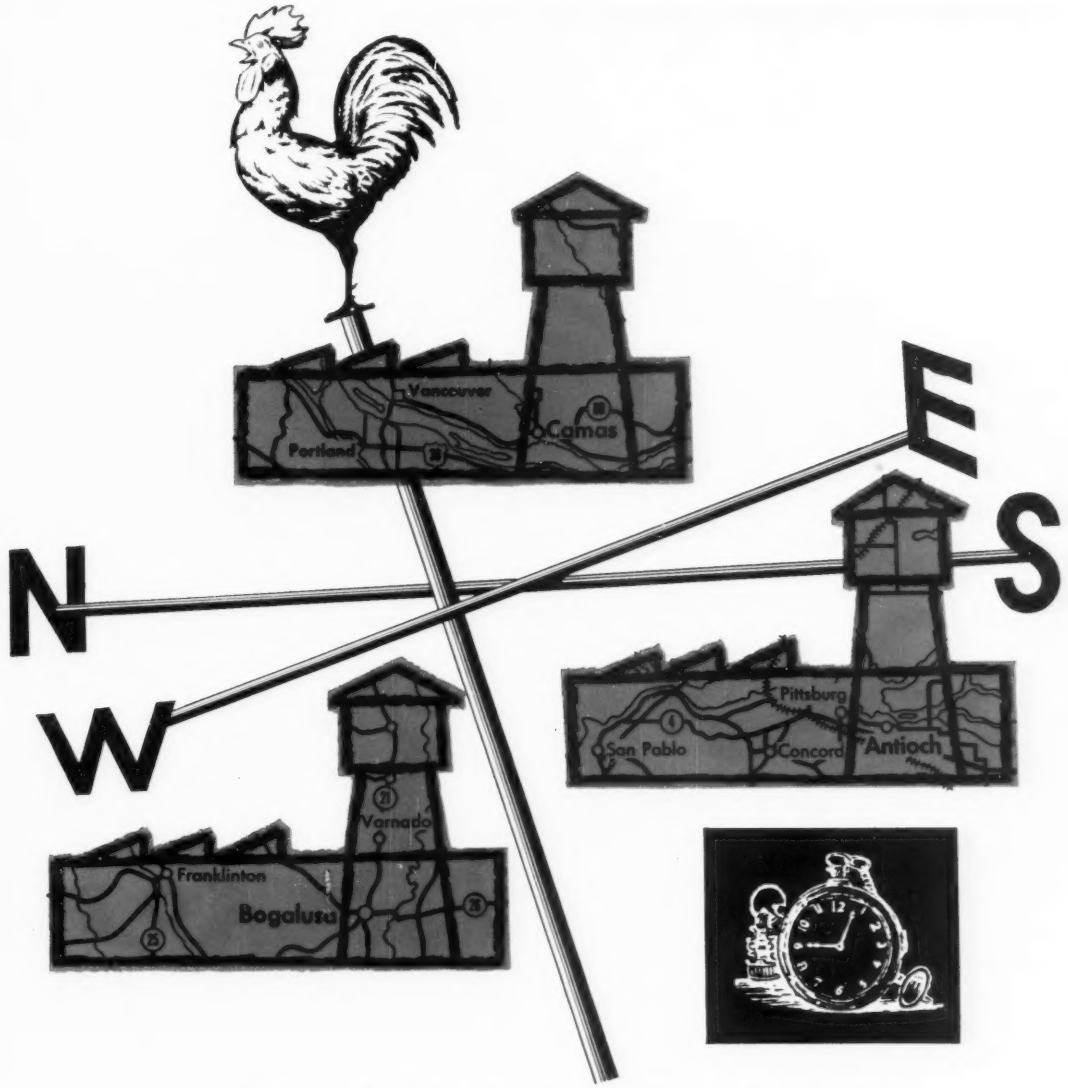
Since ripples caused by charging or by surges in the molten metal constantly alter electrode spacing, instantaneous repositioning of three 4,000-lb. electrodes presented a formidable engineering problem. But by utilizing a rotary regulator and controls to actuate a hydraulic servo-system, the engineers came up with a workable solution. In tests under actual operating conditions, the control system has proved its ability to move the 10-ton load of electrodes and holders within $\frac{1}{12}$ of a second after receipt of the control signal; it completely reverses the direction of electrodes in $\frac{1}{3}$ of a second when they're traveling at a rate of 10 ft./minute.

Continuous Process: Net result of Asarco's carefully engineered arc-melting unit is a smooth-working, continuous process. Here's how it works:

Copper cathode sheets are preheated to 1500-1600 F in a rotary, oil-fired preheat furnace. This step uses relatively inexpensive oil, provides a low-sulfur-content feed to the arc furnace. Oil-fired reverberatory furnaces, on the other hand, can utilize cheap bunker C oil only for initial heating, require higher-grade, low-sulfur (not more than 0.25% S) oil for the final stage of heating.

Heated cathodes are transferred from the preheat furnace to the arc furnace in which the metal is melted and heated to 2100-2150 F. Molten copper flows continuously from the arc furnace by displacement and by adjustment of the furnace tilt angle. At the rate of 2 tons/minute, it flows down a launder to a 10-ton electric holding furnace, where its temperature is adjusted to 2030 F for casting. The metal is also sampled at the holding furnace to permit precise regulation of its oxygen content prior to pouring.

From the holding furnace, the cop-



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per discharges into a pouring ladle, which casts the metal into bone ash-coated molds on a large circular casting wheel. The continuous arc-melting process simplifies the casting job by permitting the metal to be poured at convenient rates. Reverberatory furnaces, by contrast, commonly turn out one 300-400-ton batch per 24-hour cycle, all of which must be poured in no more than 5 hours.

Some other advantages of electric-arc melting over the reverberatory furnace method:

- Elimination of slags that must be reprocessed for metal recovery.
- Reduction of auxiliary processing materials (reverberatory furnaces use considerable quantities of expensive iron blow pipes, refractories and green poles for the removal of sulfur impurities and excess oxygen from the refined copper).
- Elimination of waste-heat boilers, required by reverberatory furnaces to improve thermal efficiency.

Growing Trend: Though electric-arc furnaces are common in the steel industry, their application to copper refining is a recent trend. Asarco's Perth Amboy plant is the first to install an arc furnace with sufficient capacity to handle its entire output of copper. And only six other copper refineries throughout the world have adopted this type of melting.

Flexible Duplication

Rayonier this week formally opened a $25-million chemical-cellulose and wood-pulp plant at Jesup, Ga. A mirror image of the company's 4-year-old, 100,000-tons/year unit, it doubles the capacity of the Jesup plant, lends more flexibility to the process.

Design of the new mill was frozen three years ago after the first Jesup unit proved the success of the then-new Rayonier-developed process.

At the feed end of the process, Rayonier doubled chip-storage capacity with the installation of six new chip silos, put in a new feed conveyor that can supply either processing unit. Each mill has its own complement of eight A. O. Smith digestors that discharge pulp to a common bleach plant. Bleaching operations were improved by the addition of pulp storage tanks to provide better blending of in-process material.

At the product end of the process,

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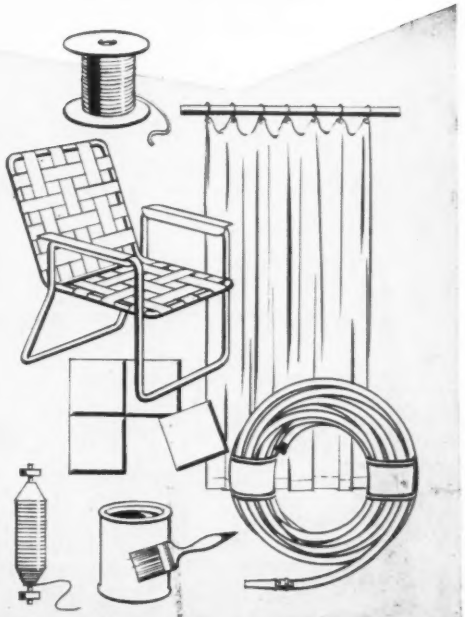
For years the use of acetylene commercially was limited primarily to the welding torch. Today, it is one of the brightest stars on the petrochemical horizon, with some 80% of total output serving as basic raw material for many of the "miracle" synthetic fibres and hundreds of other important plastic products, including *acrylic fibres, resins, solvents,* and *synthetic rubber.*

Key factor in the phenomenal growth of acetylene has been the recent development of processes for its production from natural gas. Among these new production techniques, the BASF process has had the greatest success, because of its commercially proven economy, safety and reliability.

With exclusive rights in all North American countries* for the BASF process, Chemico has designed and constructed facilities for the production of more than 150,000,000 pounds per year capacity of acetylene. This total includes the world's largest plant for producing acetylene from natural gas. This experience enables CHEMICO's highly skilled staff to handle acetylene projects with maximum efficiency and economy.

*On occasion those rights have been extended to other areas, through special arrangement with BASF.

If you are interested in the profit making opportunities offered by acetylene, we suggest you send for CHEMICO's new acetylene brochure (Bulletin No. 257), which will give you more detailed information on the BASF process and CHEMICO's experience in this field.



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pulp machinery in the new mill is a duplicate of the earlier installation. But the finishing and warehousing facilities of the original plant were already so large that Rayonier elected to expand, rather than duplicate, this vast, roofed area.

Utilities Revamped: The only duplication of utilities at Jesup is the new mill's water supply system. It provides an additional 24 million gpd., including 9 million gpd. of softened water, from four new wells.

The mills' common power plant was redesigned; power output was boosted with two new Westinghouse generators, each of which produces 7,500 kva. The generators are turbine-driven by steam from a new 200,000-lbs./-hour, Babcock & Wilcox power boiler that burns either bark or, occasionally, oil. An additional recovery boiler, nominally rated at 450 tons of kraft pulp, was also installed to provide efficient burn-up of all organic material in the cooking liquors, leaving only minerals to be recovered.

Lignite in a Fluid Bed

Commonwealth Scientific and Industrial Research Organization (Melbourne) has developed a new process of gasifying lignite with hydrogen to produce methane.

The reaction is carried out continuously in a fluidized bed at 300-600 psi., 500-850 C. The lignite is introduced into the bed as a suspension in the hydrogenating gas stream at a gas-to-coal ratio of 20-140 cu.ft./lb. Maximum methane yield obtained during experimental runs: 10.1 cu.ft./-lb. of coal, 75% of which was gasified.

CSIRO reports that it has not yet succeeded in simultaneously achieving a high degree of gasification and a product of high calorific value. But test results indicate that, for the same degree of gasification, the fluidized reaction produces more methane, absorbs less hydrogen than does static-bed gasification. Reason: the almost instantaneous heating of fluidized particles avoids loss of coal hydrogen, which occurs if pyrolysis takes place before the particles reach the temperature required for hydrogenation.

Australia's State Gas & Electric Corp. is producing town gas from lignite in a 15-million-cu.ft./day Lurgi gasification plant at Morwell (*CW June 15, '57, p. 98*).

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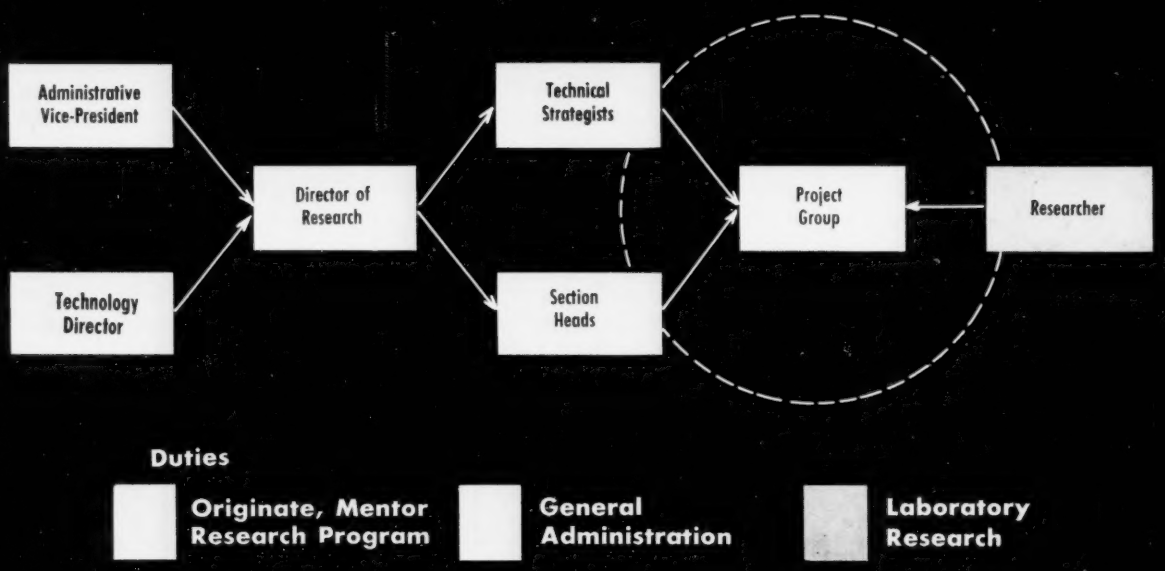
New Way to Organize

Smith, Kline & French Use Strategists to Conceive and Follow Projects



High-Command Strategists: A Better

When Smith, Kline & French (Philadelphia) recently found its top scientists mired in administrative duties, it freed them by setting up the organization outlined above. Four of SKF's most experienced researchers* now form a board of strategists, whose sole job is to determine what to investigate and how to do it. By this week, fast-growing SKF has reason to believe its innovation is a success.

SKF's system is unlike older forms of research organization (*see chart*) in its reliance on two separate chains of command.

At SKF, one chain is strictly administrative, handles budgets, personnel evaluation, etc. Bench chemists report to section heads on both their personal matters and their work progress—as they do in conventional research systems.

The other chain is technological, headed by a technology director who has the approximate status, though not the title of vice-president. It is here that the board of strategy plays its part—its members confer with the technology director, research director and section heads. And on technical matters, bench chemists are guided by the board of strategists as well as by the heads of the sections.

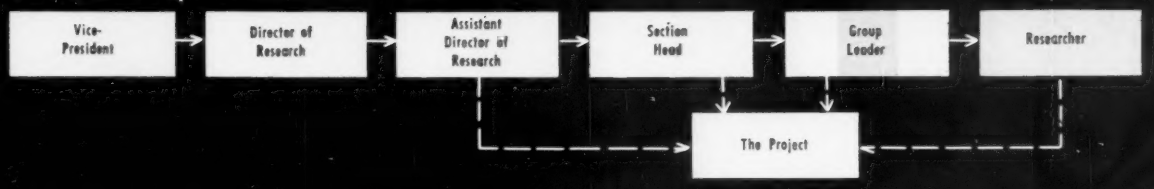
Time to Think: W. Furness Thompson, vice-president of SKF's research and development division, tells *CW* the plan is accomplishing its primary purpose—using technical brainpower to best advantage. There have been other benefits, too. Each strategist is able

* A. E. Heming, E. J. Fellows and G. E. Ullyot were transferred from the company's laboratories department to research operations, became associate directors of research in specific fields (e.g., chemotherapy, psychopharmacology, drug structure). R. H. Blythe was appointed director of (and strategist in) pharmaceutical research.

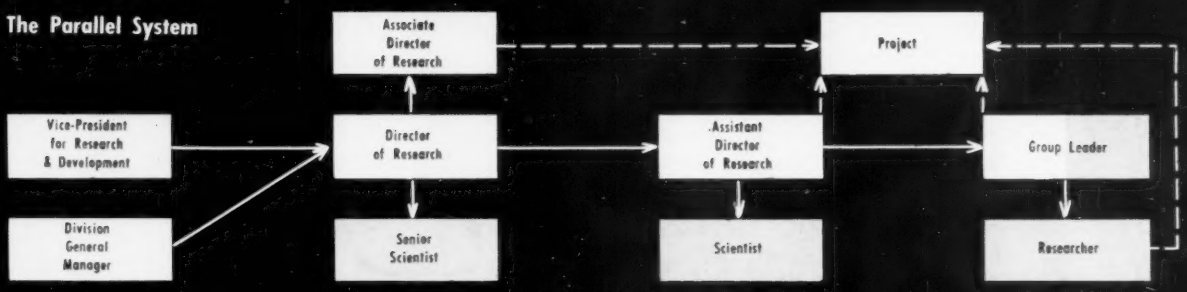
Research

Here's How Other Research Organizations Compare:

I. The Traditional System



II. The Parallel System



III. The Committee System

Way to Use Research Brainpower

to work on several projects at once although he doesn't do actual lab work. He can direct that a whole section (chemotherapy, biology) help if a project strikes a snag; abandon and start projects at will.

SKF believes that good ideas are initiated faster and put into action speedier than by any other system. Long and short research projects are quickly delineated, conflicts quickly resolved.

And the bench chemist, workhorse of any research organization, also appears pleased with the new arrangement. Thompson reports the system helps build *esprit de corps*. One reason is that the setup counts heavily on ideas "from the bench."

And, though lab men are advised on the approach to a given problem, they are not forced to follow the route outlined by the strategists—dissenting researchers get a chance at frequent meetings to explain their views to SKF's research top management, translate them into action if they're justified. (Normally, an SKF researcher spends 20% of his time on his own drug research projects.)

No Panacea: Thompson points out that the new plan is particularly suited to drug research, which abounds in specific and clearly defined areas of investigation. It is not necessarily ideal for other types of chemical process firms. It also fits in well with SKF's well-known emphasis on the committee approach to company management. Thompson admits that the new system also leads to a certain amount of confusion because line researchers report to two supervisors—the section leader and the strategist.

Furthermore, the system is time-consuming. Many

SKF strategists Ullyot, Fellows and Heming plan (left) and direct (right) research projects.

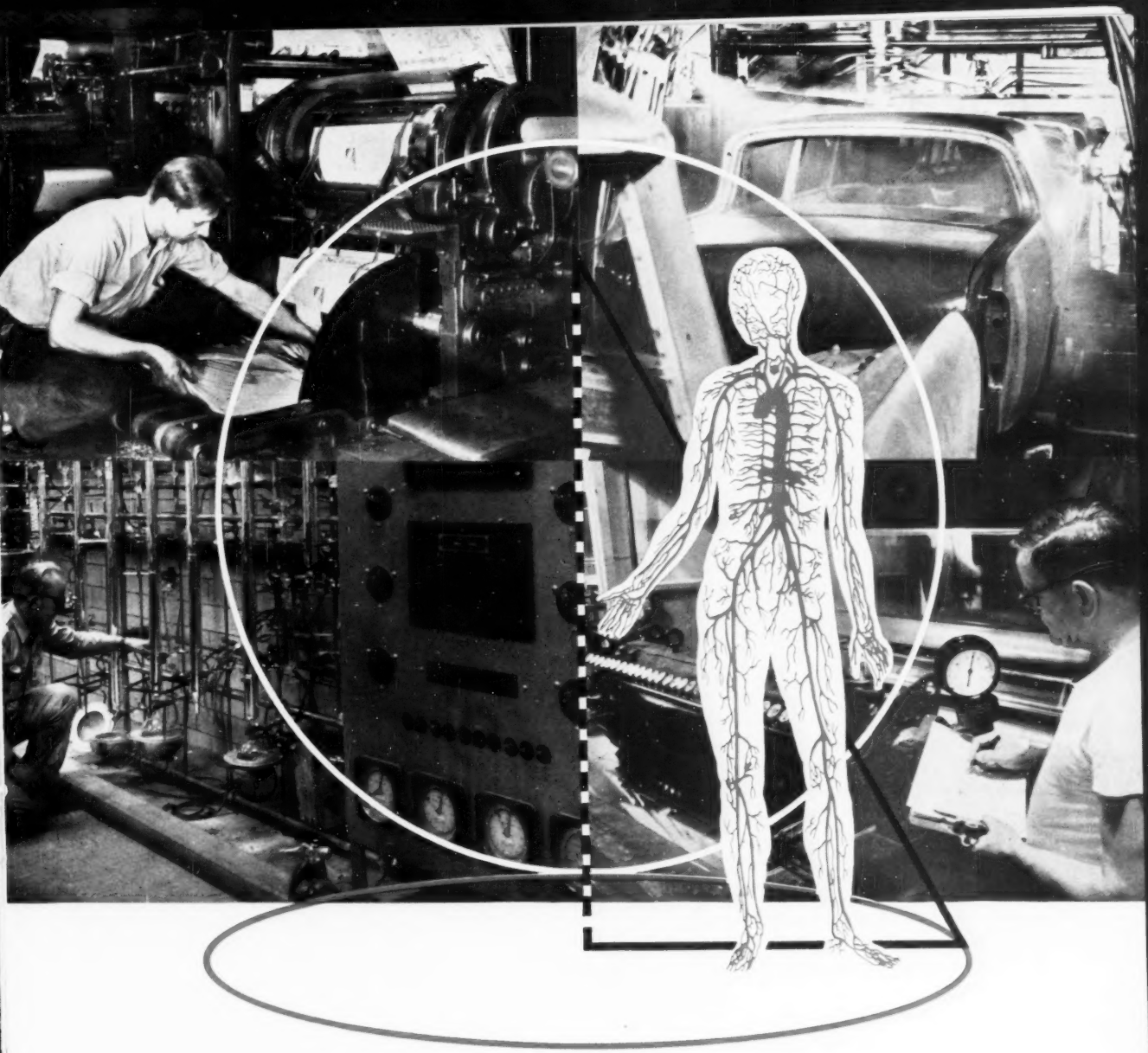
individual suggestions must be sifted in conference, conflicting views of scientists must be resolved.

Matter of Semantics: Some companies, even those that have also modified their research organizations, wonder how SKF's strategists can 'guide' research without 'administering' it. The answer lies in the company's definition of the terms: guidance concerns instruction and advice on technical matters; adminstration covers routine (e.g., salary adjustment) matters that apply not only to research but also to other company personnel.

Other companies are approaching the continuing problem of divorcing these two functions by techniques that differ from SKF's system. Monsanto, for example, fixes the responsibility for guiding research on its functional vice-president—research development and engineering. Each producing division maintains one or more laboratories devoted to finding better processes or products pertinent to the division's interests. Research guidance in the divisions is the responsibility of the division research directors and their assistants or associates. Monsanto also operates a central laboratory in Dayton, O., for long-range projects (under a division research director).

But Monsanto does depart from this somewhat traditional system by means of its "senior scientist" program. Senior scientists are largely free from administrative duties. Having proved their ability in chosen fields, they are given appreciable freedom to pursue projects of their own choice. These men differ from SKF's strategists, however, in having laboratory rather than strictly planning assignments.

Monsanto senior scientists and scientists swap ideas in the Queeny conference room.



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Electrical	Textiles

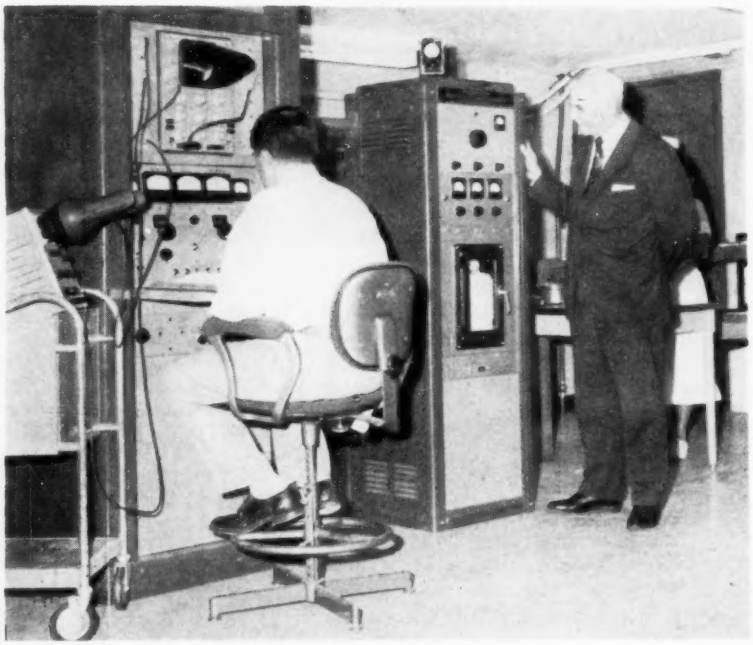
The senior-scientist plan also enjoys favor with other companies, although titles assigned to chosen researchers may be different (e.g., Hercules calls them research associates.)

In the drug industry, Pfizer has tackled the problem of master-minding its research in still a different way. A special operations group is maintained to advise not only research but also other divisions of the company on long-range planning. Pfizer's research setup functions along the lines of the committee system *(Chart III, p. 53)*.

Despite SKF's progressive treatment of its researchers, there's no doubt who holds the research reins. At last week's American Management Assn. meeting in New York, SKF President Francis Boyer revealed (among other viewpoints on research) his belief that the head of a research division should be a lay administrator.

"The top scientist who is also a top administrator is a rare bird, indeed," said Boyer. "It is often hard for the scientist to understand that top management, by its very nature, is always forced to derive sufficient conclusions from insufficient premises. Management has to ride hunches and, quite humanly, wants some scientific company on these lonely rides. The top research man has to be the interpreter of management to science. He must make the scientist realize that management knows well that the forcing of scientific data leads only to catastrophe; nonetheless, management asks from time to time, if a hypothesis—admittedly unproved—works out, what then?"

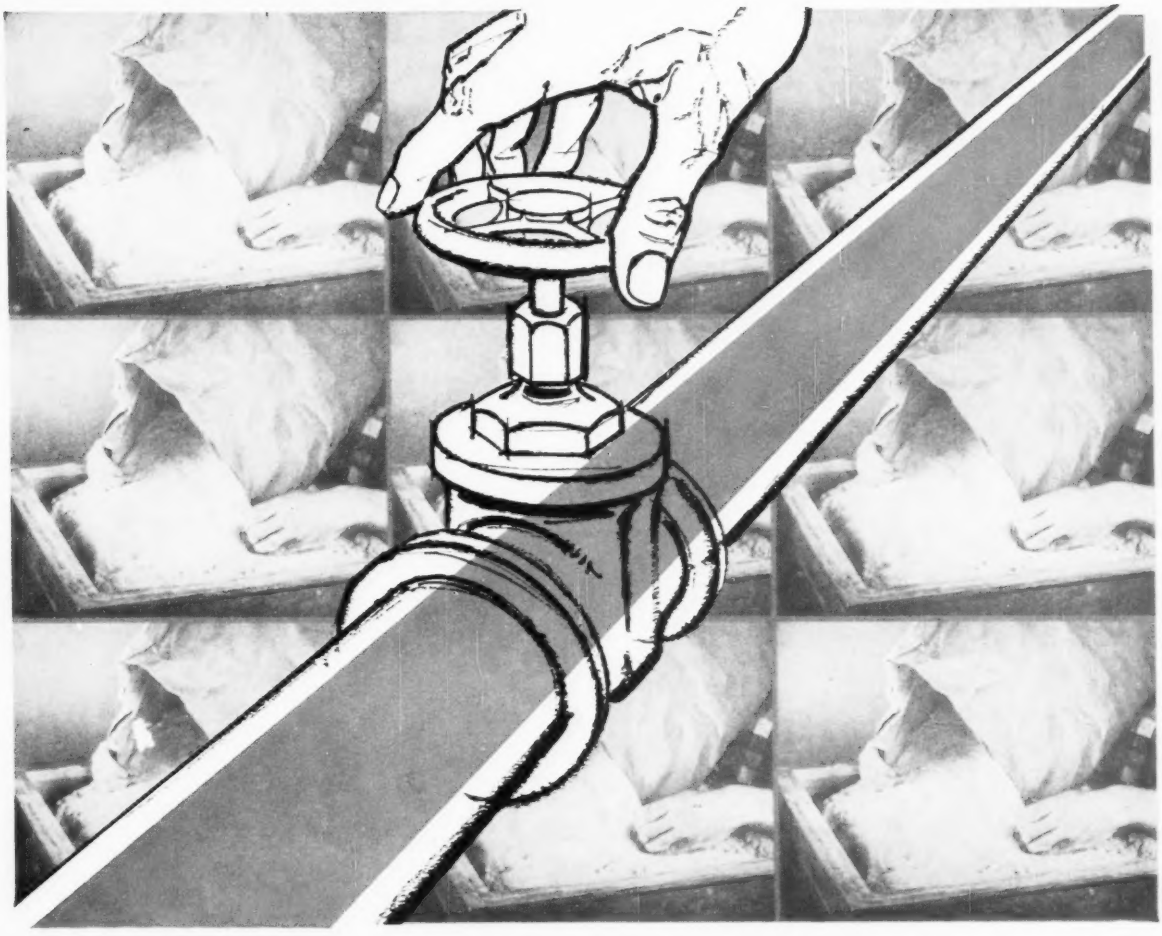
Under its new system, SKF research administrators will have more time to think up an answer.



Linear Accelerator in Plant Debut

Walton Van Winkle, research director for Ethicon, Inc. (Somerville, N.J.), last week saw the startup of his firm's new 7-mev. linear accelerator, first radiation machine of its kind to be harnessed for production duties. The device, engineered and constructed by High Voltage Engineering Co. (Burlington, Mass.), will be used for routine sterilization of surgical sutures.

Ethicon started its research on radiation sterilization in 1949. In '55, The Upjohn Co. (Kalamazoo, Mich.) pioneered commercial drug sterilization with a Van de Graaff accelerator *(CW, Aug. 6, '55, p. 70)*.



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LIONEL CRAWFORD

Aimed at closer customer contact, extensive field work by top-level executives is a trend.

Behind Today's Sales Call: More

What's the current national chemical sales situation? Ruggedly competitive, shows *CW*'s latest country-wide industry check, and likely to get rougher. Coast to coast, sales managers report an "alarming" growth in reciprocity — "we'll-buy-from-you-if-you'll-buy-from-us"—in demands for rush delivery, stepped-up solicitation, fringe services and sales gimmicks.

And of all trends characterizing selling in '58, none is as pronounced as the increase in the "reciprocity" sales approach. Company after company, squeezed by competitive conditions "just a shade better than in the dead of the depression," plans to use it oftener—and some have even put their service on a reciprocal basis.

Most reciprocal deals are being arranged through top-level executives. In more and more instances, top marketing men will be on the road this year, calling on key accounts. To be sure, reciprocity isn't the only reason for their visits—in many cases, their purpose is to demonstrate a sincere interest in the customer, establish closer contact, apprise him of new developments and extend offers of special services.

Going Steady: The desire to have a buyer who can be depended upon is probably the main reason for the rise in selling by management. And whether key sales

Rush service and materials-handling counsel will put a sharper edge on the '58 sales tool.

Entertainment and more frequent sales calls offer little room for trimming sales overhead.

Reciprocity, More Service, More Cost

people call their programs "trade relations," "balance of trade," or "sales relations," the terms have taken on an increasing resemblance to reciprocity.

Reciprocal sales agreements, sales managers tell *CW*, are "hard, if not impossible, to sell against." (Which helps explain its rise.) And if a company manufactures many of its own raw materials, it finds few opportunities to make competitive reciprocal offers.

Even companies using reciprocity must guard against sales staff complacency—a "let reciprocity do the work" attitude.

Rush Requests: Topping the problem list in supplier services are demands for rush shipments. These stem from two principal causes: (1) a slight, but apparent, increase in "spot (noncontract) buying" that's noticeable in heavy industrial chemical purchasing; (2) and a higher-than-normal year-end inventory adjustment. Some suppliers are attempting to meet the problem by improving warehouse and carloading techniques.

Most sales managers expect increased pressure for other services—packaging modifications, special product specifications, and quality-control tests on semibulk shipments. They take opposite stands, however, on extending special services. For some, it's the key to

bigger orders; for others, a profit-whittling venture. Some are considering special charges for such services as routine quality-control checks, packaging modifications.

Materials-handling advice and studies loom as services that will be more freely offered this year. That's largely because they offer considerable opportunity for converting a customer to bulk or semibulk buying and giving him price savings. Moreover, the cost of providing the service is offset by economies in bulk selling. The expected rise in freight rates will help accelerate materials-handling aid.

Gimmicks and Pricing: By and large, sales departments will attempt to hold the line on the "sales gimmick." There's an acute awareness that gimmicks that offer premium quality at technical-grade prices, or drum allowances, or extra bill payment time, all push profits down or prices up. Yet, many expect competition to spur a slight rise in assorted forms of "price chiseling."

Low-priced imports are becoming more burdensome (especially in the drug and fine chemical field) and even a problem on the West Coast. And smaller manufacturers are worrying about price cutting on test samples of chemicals not in commercial production. Competitors offer development samples at full-scale production prices. Result: a shortened period of price protection following introduction of the products.

Credit extension remains a touchy problem. The slowdown in bill payment renders sales efforts useless if the account is delinquent and the order can't be accepted. And increased pressure for prompt payment jeopardizes cordial sales relations. Despite credit department efforts to tighten credit extension, credit will continue to be widely used as a sales tool.

Coverage: Sales staffs will be expanded in the coming months. But with few exceptions, the increases will be modest—usually under 10%. Aim of the expansion: reduction of territory size, and increased frequency of customer calls. The trend toward concentration on the bigger, more profitable accounts will continue—even the thought of losing one of these hurts. But there's likely to be more attention paid this year to the medium-sized customer, to lessen the dependence on any single buyer. By the same token, "smoke stacking" will be a little more prevalent.

Sales office service is due for strengthening in the months ahead. Several firms are planning to adopt the "inside salesman" concept. His function: answering telephone inquiries, keeping tabs on status of road salesmen's orders. The upsurge here stems partly from purchasing agent complaints of poor followup service, partly from increased demands for rush service, partly from a desire to free salesmen for more time on the road.

Although there's a trend to intensive coverage, competitive conditions are, in a few instances, forcing coverage contraction. A few sales managers expect to coalesce sales territories, reduce the number of men in a territory.

Cost Currents: The pressure of service, competition and coverage will push marketing costs up. Most sales managers, for example, predict a moderate increase in salesman compensation. Travel costs will probably stay the same. And, the expense of customer and technical services, despite a tighter rein, will increase. The '58 promotion budgets, too, generally record larger figures.

Economy drives of recent years have left little room for major cuts in marketing costs, but sales managers, nevertheless, will make an attempt. Some will aim at improved sales forecasts with an eye on reducing costs of inventory; others will standardize office procedure in an effort to improve service without adding personnel.

Cutbacks in long-distance telephoning are planned by several companies. An Eastern producer will make entertainment more "selective," relate it more to order-getting. In the Midwest some companies are swinging over to less-expensive types of packaging, switching from salesman-owned to company-owned cars. And many are stressing better utilization of the salesmen's time to get more business per cost-dollar.

More firms are putting small volume business into the hands of distributors.

But these moves can produce only small savings. "It's impossible," says one typical regional manager, "to reduce expenses under tough competitive conditions." And that's exactly what sales staffs face now.

ANTARA OFFERS–

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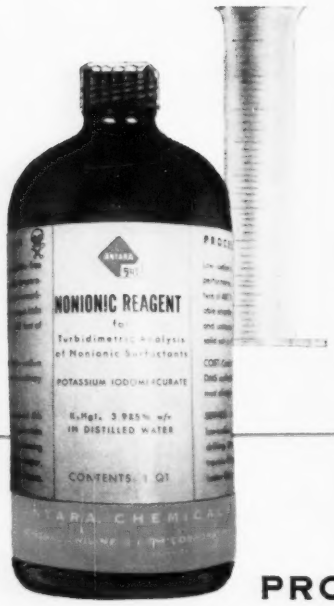

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Nonionic Reagent forms a turbidity with nonionic surfactants which is the basis of the method of analysis.

PROCEDURE:

Prepare an aqueous solution of the sample to be analyzed at a concentration of 0.01-0.5% w/v active nonionic.

1. **Place 5 ml Nonionic Reagent in a 25-ml graduate.**
2. **Add with volumetric pipette 1-5 ml of the nonionic sample to be analyzed.**
3. **Fill graduate with water to 25 ml, mix well, and let stand.**
4. **After 10 minutes, compare turbidity with that of standards of known concentration prepared by the same procedure.**

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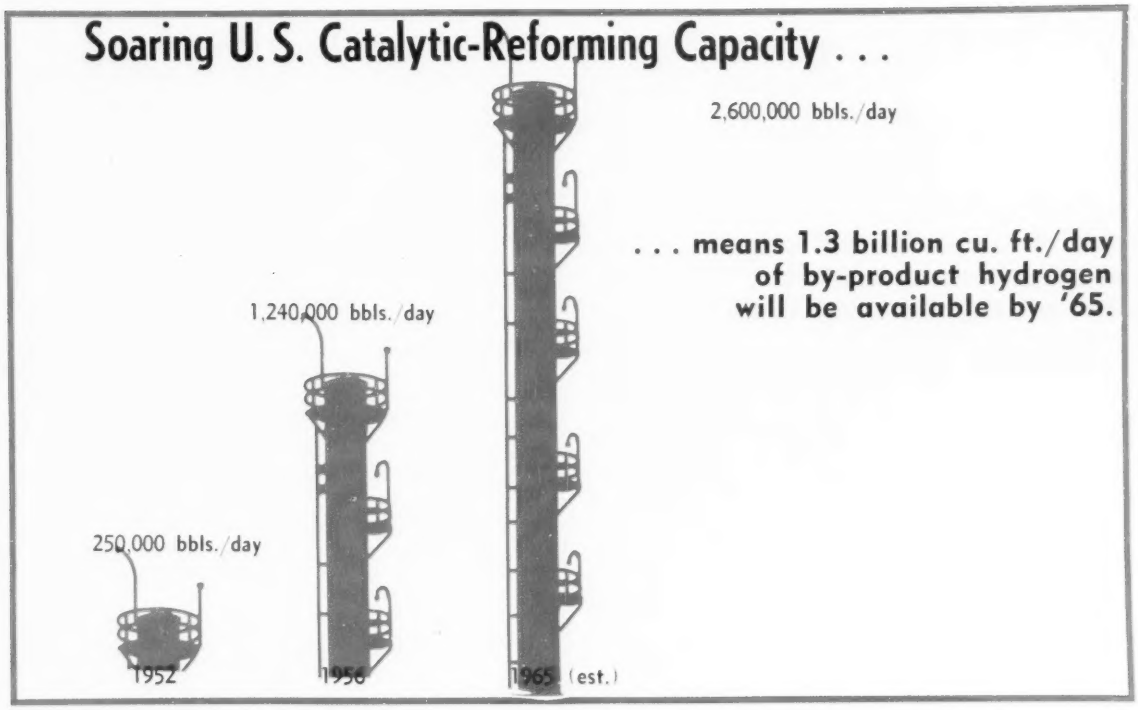

Reformer Hydrogen: More for Chemicals

Chemical manufacturers using hydrogen are taking keen interest in the whopping jump in catalytic-reformer hydrogen capacity—400% in the past four years. And for good reason: reformers produce a convenient source of inexpensive by-product hydrogen.

But the bargain hydrogen is now largely going into the petroleum industry's captive uses—as a fuel, and to upgrade other products—and chemical companies hopefully eyeing it for future uses are this week asking these questions:

- Just how much reformer-hydrogen will be available in the future?
- How much will the petroleum industry use, and how much will it sell to outsiders such as the CPI?
- Where will the producing plants be? (Reformer hydrogen is economical only if the using plant is near the producing plant.)

Vague Answers: Unfortunately, the petroleum industry has no ready answers to these questions. Predicting the capacity for a decade ahead is a complex job—and those making forecasts are in agreement only in one major area: the recent spectacular increase of U.S. catalytic capacity will taper off. In terms of oil processed, estimates are that U.S. capacity in '65 will be 2.5-2.6 million bbls./day. Capacity in '56 was approximately 1.24 million bbls./day (about 15.7% of total refinery runs)—of which hydrogen yield varies from 400 to 800 cu. ft./bbl.

How Much Where: Although it's plain that the U.S. Gulf Coast will get the big part of new reformer capacity, the number of plants and their oil and hydrogen capacity is still debatable. For example, R.F. Pfennig, of Humble Oil & Refining, estimates that about 1 million bbls./day of total U.S. oil-reformer capacity will be located in the Gulf area in '65; John G. McLean, of Continental Oil, on the other hand, says the capacity will be about 675,000 bbls./day in '65, assuming that the area holds its current 26% share of total capacity. To make estimates in terms of hydrogen, Pfennig assumes an average yield of 500 cu. ft. of hydrogen per barrel of feed material, (actual yields vary from 400 to 800 cu. ft./bbl.), sets '65 hydrogen capacity from this source at 433 million cu. ft./day. McLean says the average yield is closer to 700 cu. ft./bbl., figures '65 reformer-hydrogen capacity at some 465 million cu. ft./day. Either estimate implies, however, that the nation's total reformer-derived hydrogen capacity will be considerably in excess of 1 billion cu. ft./day by '65. That's about 10 times more than total U.S. nonreformer-hydrogen output in '56 as reported by government agencies.*

Captive Consumption: Disheartening to the chemical industry is the plain evidence that refineries will consume most of the hydrogen they will

*U.S. production of nonreformer hydrogen in '56 was 37.7 billion cu. ft. This does not include hydrogen used in such applications as manufacture of ammonia and methanol, petroleum refining, Hydroforming, etc.

make. There are now two principal uses for such hydrogen: for fuel, and for desulfurization and quality upgrading of refined products. The latter use, of course, gives hydrogen its greater economic value. Hydrogen's value as fuel depends on its Btu. content (determined by its purity), and its relation to cost of the user's alternate fuel, i.e., natural gas.

The refineries' own processing uses of hydrogen, aside from desulfurization and upgrading of quality feed stocks, are to improve storage stability, color, odor and other qualities of finished products, and to make components for aviation and motor gasolines.

These hydrogenation processes will show dynamic growth, say petroleum people, because of increasing use of sour crudes and because of increasing demand for better-quality finished products.

Recent growth of the U.S. oil industry's hydrogenation capacity has been spectacular, to say the least. In a little more than two years, capacity jumped 550% to the 713,000-bbls./cd. (barrels/calendar day) capacity estimated for '57. This growth will continue, albeit at a slower rate, and capacity should hit 4.4 million bbls./cd. by '65. Of this total, about 1.5 bbls./cd. will be located in the Gulf Coast area.

Refiners are in a better position to use the hydrogen than virtually any other chemical processors for two major reasons (aside from cost): (1) reformer-produced hydrogen can be applied to desulfurization and upgrading operations at the purities and pressures of reformer output; (2) the hydrogen supply is in constant proportion to the volume of feed stocks and finished products to be treated.

Ammonia Feed Stock? The use of hydrogen as fuel has seemed a deplorable waste to many chemical producers; hence, considerable effort has gone into evaluation of the economic feasibility of capturing reformer hydrogen for processes such as those for ammonia production. Results so far have been fairly encouraging, but ammonia producers' early enthusiasm for the reformer gas has waned because the economic aspects no longer look as tempting as they did a few years ago.

The much-publicized overcapacity of ammonia in the U.S. has also helped curb immediate development along these lines; but interest will likely be renewed when ammonia demand begins to catch up with supply—perhaps in three or four years.

At present, only about 1.5% of the total amount of hydrogen used in U.S. ammonia production comes from reformers. That percentage is expected to increase markedly in the years ahead; how much is conjectural.

Rekindled Hopes: There's some reason to think rising ammonia demands in areas close to U.S. refinery concentrations could revive interest of ammonia makers in reformer hydrogen. It's estimated that the Gulf Coast area will require 1.3 million tons/year of ammonia by '65 to meet nitrogen plant food requirements. Other uses of ammonia, e.g., in manufacture of other chemicals, explosives, synthetic fibers, plastics, petroleum refining, now use 21.5% of total output. Growth of these uses will likely increase at least as much as fertilizer uses.

It adds up to a probable demand of at least 1.8 million tons/year of ammonia in the Gulf Coast area by '65. Consequently, new hydrogen requirements will be some 100 million cu. ft. a day.

But all of it cannot be obtained from reformers. Reasons: all the fertilizer markets will not be close enough to the refinery area, and only large refineries can produce enough hydrogen to justify the building of an ammonia plant.

Where the fertilizer markets are near, of course, there are advantages in using reformer hydrogen for production of ammonia. Ammonia plants based on use of reformer hydrogen are cheaper to build than those that use natural gas, fuel oil or coke. (The hydrogen-producing section of a converted ammonia plant can be eliminated; there's a reduction in cost of compressor investment and operation because the reformer hydrogen is delivered at high pressure.)

However, these advantages are partly offset by the seasonal fertilizer requirements, which account for about 75% of total ammonia needs. This necessitates extensive and costly storage capacity because the present market area for fertilizer is far removed from the refineries.

Another factor worth considering is that competitive pressures are forcing

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new ammonia producers to make various ammonia derivatives. Increasing demand for ammonia derivatives would favor reformer-based ammonia plants in planning for new ammonia capacity.

And in any case, the petroleum industry already warns that the petrochemical manufacturer who hopes to secure economical by-product hydrogen to make ammonia must anticipate paying the refiner "somewhat more" for the gas than the price paid when it's used as a petroleum products treating agent or as a fuel.

Other Outlets: Steelmakers, besides chemical makers, may be competing for the hydrogen—they would use it in reduction of iron ore in steelmaking. If steel firms are going to handle fully integrated operations in the Gulf Coast area, for example, they will have to use some process such as hydrogen reduction because of the lack of coal for blast furnaces. There's some doubt, however, whether steelmakers will willingly become dependent on the petroleum industry for the hydrogen. Chances are they will favor hydrogen production from steam-methane reforming or partial oxidation of natural gas.

And refiners have more captive uses for their hydrogen. Potentially important is hydrocracking. This process is uneconomical now, but increased cost of crude or a change in the fuel market could make crude or residuum hydrocracking feasible. Should that occur, planned reformer hydrogen capacity could not nearly meet the demand.

Petrochemical processes such as hydrogenation of benzene to cyclohexane will increase in importance but will not make major demands on reformer-derived hydrogen. Other processes, e.g., hydrogenation of fatty oils, require high-purity hydrogen, would necessitate purification of reformer hydrogen before it could be employed.

Plainly, refineries are going to keep most reformer hydrogen for their own needs—for which purposes the supplies will be entirely adequate. Chemical manufacturers won't have very little chance to increase their share of the output. And should there be a major breakthrough in hydrocracking or iron ore reduction, the CPI wants would be filled even less easily.

Woes in the West

The current "rolling readjustment" of the U.S. economy is particularly hard felt by the nonferrous metals industry in the Mountain States area.* Here's how some of the industries are feeling the pinch:

- 10,000 lead-zinc miners and mill men are unemployed. One Colorado lead-zinc producer—Rico Argentine Mining—has shut down its mine, is living off its sulfuric acid production.
- There's "absolutely no" tungsten mining, milling and refining going on in western U.S.
- Fluorspar mines and mills have shut down.
- Steelmaking is off; 900 workers have been furloughed.
- A crimp in planned expansion of sulfuric output is blamed on cutback of uranium concentrate by the government.
- There are substantial payroll reductions among both small and big copper producers. Kennecott Copper has cut back production, and through either attrition or layoff has reduced employment by more than 1,500 at four Western properties.

Anaconda, Consolidated Coppermines, Banner Mining and Phelps Dodge all have reduced their payrolls and production, and the situation now points toward likelihood of further reductions.

Among the bright spots in the drab picture: continued flow of sulfuric acid to uranium mills and to producers of triple superphosphate and ammonium phosphate fertilizers. Outlook here is good. Production of anhydrous ammonia from steel's coke-oven gases, and of sulfuric acid from copper-smelter gases probably won't suffer much—provided steel and copper output do not drop off much more.

The Salt Lake refining district has been going through continuous expansion into Platforming for production of 100-plus octane gasolines. Employment is probably up slightly—certainly hasn't dropped.

No disposition to panic is reported: emphasis now is on reduction of overtime work and other means of "trimming the fat" from most production schedules.

*Utah, Idaho, Montana, Nevada, Wyoming, western Colorado, northern New Mexico and Arizona.

Technology
Newsletter

CHEMICAL WEEK
January 25, 1958

A new Russian synthetic fiber was described by Radio Moscow last week. Details in the broadcast were slim. The fiber was termed "stronger than steel" and suitable for a range of applications, including light fabrics, knitwear, lacework and rugs, automobile tires, conveyor belts and machine parts. The broadcast added that the Russians had discovered a way of taking gases (e.g., methane and ethylene) and converting them into a material resembling mother-of-pearl, from which the fiber or other object is formed.

But the Russians may have tipped their hand on this through previously published research reports. Press accounts carried the name of the fiber as "aynanth." That is probably a phonetic spelling of oenanth. And in an East German journal last year, Nemesjanow and 11 other authors gave a rundown of their work on a nylon-7 fiber based on oenanthic or heptoic acid *(Chem. Technik, 9, No. 3, '57)*. In a 12-page report, they described the synthesis of the acid and the properties of the fiber made from it. Essentially, the synthesis is a telomerization starting with an olefin and an olefinic chloride. The resulting chloride is converted into oenanthic acid, a higher homolog (by 1-carbon atom) of caproic acid. This is formed into the lactam, which is then polymerized into nylon. Comparing the product to caprolactam (nylon-6), they claim it is slightly stronger, bends better, has an approximately equivalent tensile strength.

The Russians also reported work on pelargonic acid (9-carbon atoms).

•

Phillips is introducing a clear film made of linear polyethylene this week. The film is tough and, as Phillips sees it, is "the first real challenger for the dominant position in the packaging field now held by more expensive cellophane and cellulose acetate." The company says the film presents a vigilant sentry against moisture, greases and gases over a wide temperature range without becoming brittle or sticky. It adds that printing or heat-sealing can be accomplished with conventional techniques.

You'll hear more from other firms on this subject soon. Grace, a licensee of Phillips polyethylene process, has developed its own film, is convinced that it will be a serious contender. Other firms have similar products in varying stages of development.

•

Total synthesis of L-monosodium glutamate, the flavor-enhancer for foods, has just been worked up by Du Pont. Result of a four-year research effort by its Explosives Department, the process is claimed to make the product more economically than presently employed methods. Optical purity is better than 99.5%; the new synthetic meets quality specifications on all other counts. There's no word about immediate commercialization, but Du Pont does say that lab studies look so promising it is stepping up engineering studies leading up to plant design.

Not much is known about the process. But Du Pont (among others) has showed a continuing interest in synthesizing the glutamate, has received at least one patent for making it from cyclopentadiene. The process, it says, can employ any of several raw materials, and that phase of the operation is now under study. Applications to cover the new process and alternatives have reportedly been made.

In this country, commercial production of L-sodium glutamate centers on hydrolyzing waste from sugar production. The Japanese have recently put in a fermentation process *(CW, Aug 24, p. 37)*.

•

Metal-on-metal is making news this week on two counts:

• U.S. Steel is putting the finishing touches on its development program for aluminum-coated barbed wire and farm fences. The new material has undergone extensive field tests and has showed no signs of deterioration in up to five years' service. Its service life is said to be considerably longer than that of conventional zinc-coated wire. After a few weeks, the wire takes on a golden color. But U.S. Steel thinks this will enhance its sales value. The firm indicates it is getting ready to offer the aluminized wire commercially in the near future.

• Sylvania has just developed a process for electroplating copper on aluminum strip and aluminum wire. Aluminum, coated this way, it reports, can be tinned, soldered or formed without breaking the copper plating. The company sees the product finding jobs in printed circuitry, bus-bar conductors and elsewhere in the electrical and electronic fields.

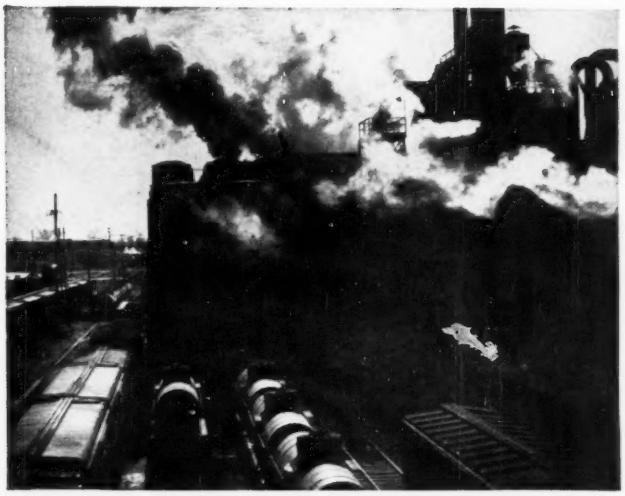
•

A new electrolytic hydrogen cell is being introduced by Pintsch Bamag (Buttzbach, West Germany). It's claimed to be particularly useful for small consumers, produces as little as 135 cu. ft./hour of hydrogen, 67 cu. ft./hour of oxygen. Also claimed for the new cell: relatively low cost, efficiency comparable to that of bigger cells. Tagged Type 50-E, the cell is being sold in the U. S. by Columbia Technical Corp. (New York).

•

Electron beam melting, latest in ultrahigh-purity metal refining, may offer arc-melting some stiff competition in certain applications. The process, developed by Temescal Metallurgical Corp. (Richmond, Calif.), Mallory-Sharon Titanium Corp. (now Mallory-Sharon Metals Corp.) and Stauffer Chemical, is claimed suitable for purifying a number of high-melting metals. These three development participants are forming a company to exploit the process, which has application to such metals as columbium, tantalum, molybdenum, beryllium, vanadium and special stainless steel alloys.

The process employs an old principle that has never before been tried on a large scale: an electron beam is focused on the metal, where its impact creates a high temperature. Rule of thumb: the higher the melting point of the metal, the bigger the potential for electron beam melting.



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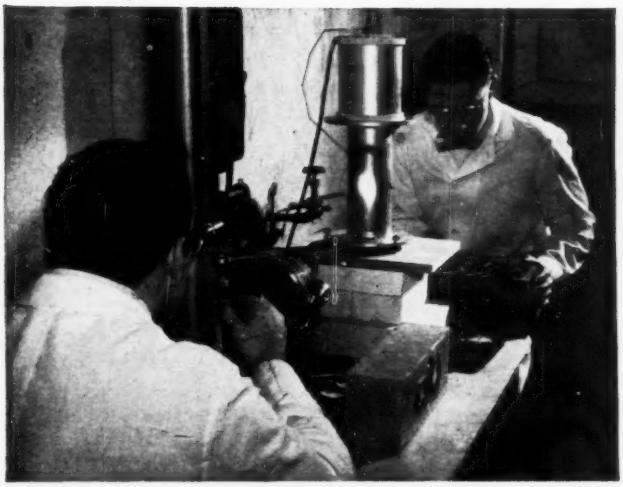

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Diphenyl
Nitrate
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Borate
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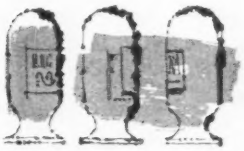
Experimental Quantities



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They Come Big for Gulf's New Platformers

The two new 26,000 b/d Platforming® units for Gulf Oil Corporation's Philadelphia refinery called for giant carbon steel towers to handle this large volume. The biggest, a pair of prefractionating columns 106½ feet tall, are said to be the longest ever shipped into Philadelphia in one piece. Built under license from Universal Oil Products Company, the installation will be used for producing high octane gasolines. The general contractor is Procon, Incorporated. Two sets of nine towers were shop-fabricated by Graver. The fabrication of these and other large towers is handled with ease in Graver's nation-wide facilities, always ample to meet the demand for bigger and more efficiently fabricated processing equipment.

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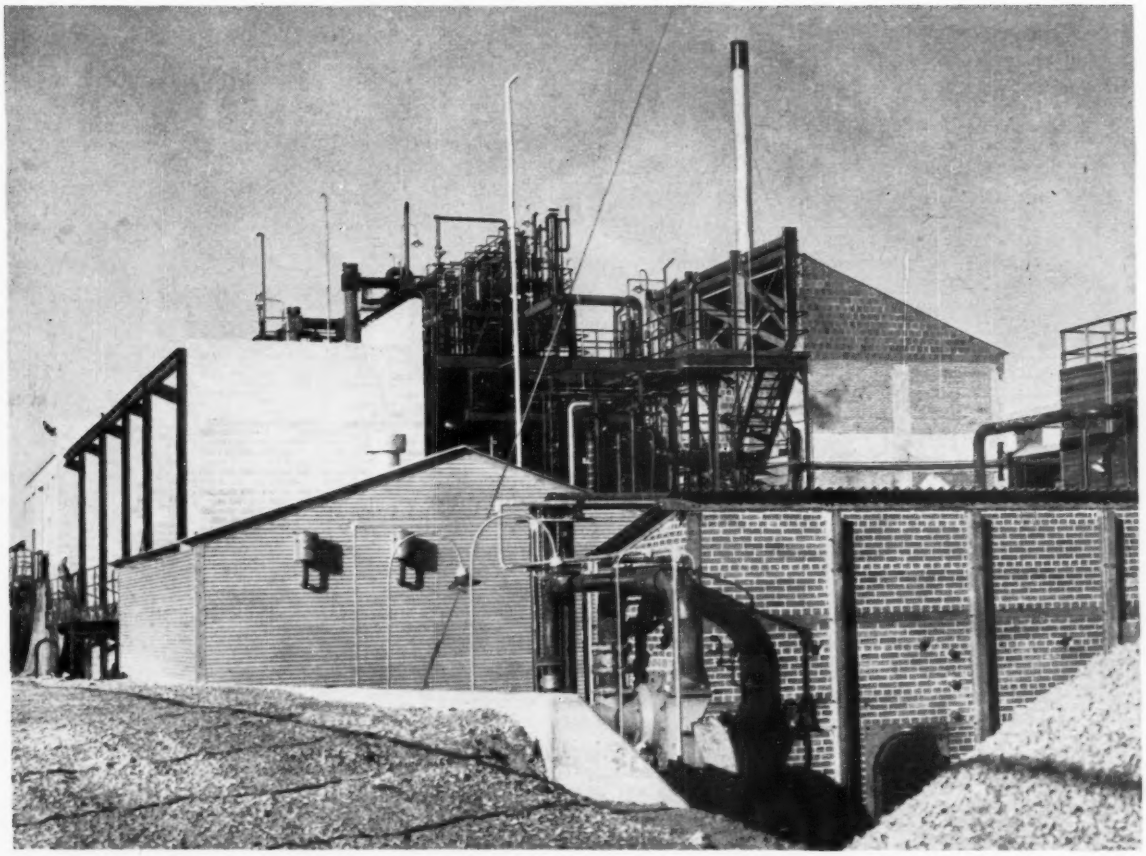


Safety aids in Monsanto's parathion unit include dual instrumentation, concrete compartments.

Insecticide Process Sets Safety Standard

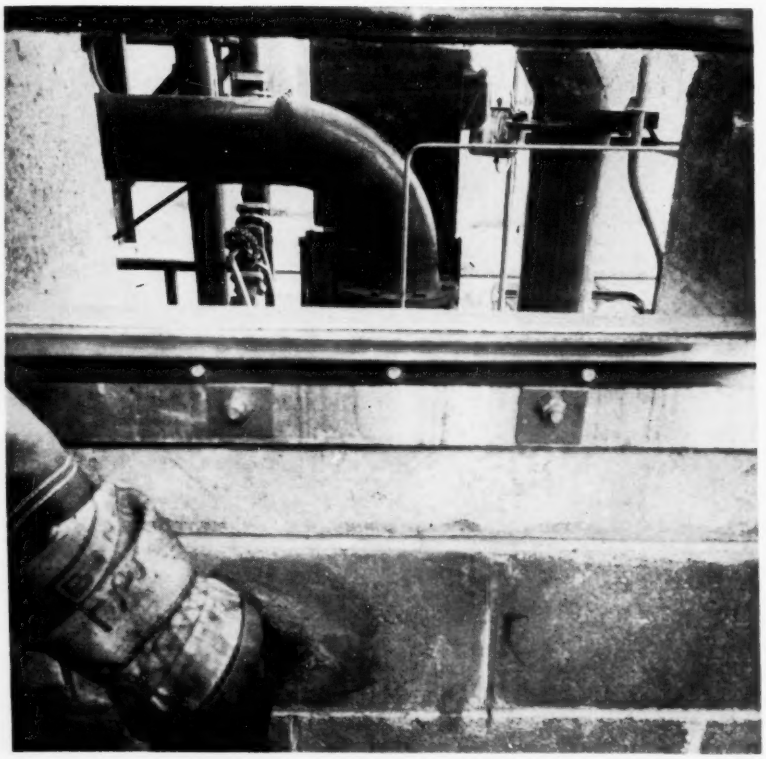
On the western edge of Alabama's pine-studded clay hills at Anniston, Monsanto Chemical last week started up a brand-new plant designed with a sober emphasis on safety. It's the firm's replacement for the Nitro, W.Va., Niran (parathion) and methyl parathion organophosphorus - insecticide plant destroyed last April in a $1-million explosion that took eight lives.

Key to safety rests in dual instrumentation, interlocking controls and cubicle-type construction. All three features are results of a safety study that included exchange of information among methyl parathion producers (*CW, July 6, '57, p. 36*). And Monsanto proved that such a thorough study and safety-first designing need not slow construction. The plant was onstream within nine months of the Nitro disaster, and within six months and 10 days from time of initial design work. This is about one-half the usual time for such a project, according to Catalytic Construction Co., the engineering firm hired by Monsanto for the project.

Old Process: Monsanto will not reveal the capacity or cost of the Anniston unit. But Charles H. Sommer, vice-president and general manager of the Organic Chemicals Division, confirmed that capacity "considerably exceeds" the output of Nitro.

Also unrevealed is Monsanto's process, although Howard Minckler, director of manufacturing of the Organic Chemicals Division, confirmed that the process is a classical one that "can be found in text books." It follows the route of phosphorus pentasulfide esterification, followed by chlorination and then condensation with *p*-nitrophenol. (A more descriptive name for parathion is O,O-diethyl O-*p*-nitrophenyl thiophosphate; methyl parathion is O,O-dimethyl O-*p*-nitrophenyl thiophosphate.)

Unstable Intermediates: Several of the intermediate compounds of the process are unstable, can cause trouble if temperatures rise too high. A Nitro investigation showed that there had been an instrument failure during the chlorination step of the methyl parathion process. Reaction temperature rose in a shorter time than anyone realized while the instrument was being repaired on the spot, and the reaction vessel ruptured. The room filled with fumes, and a second explosion—



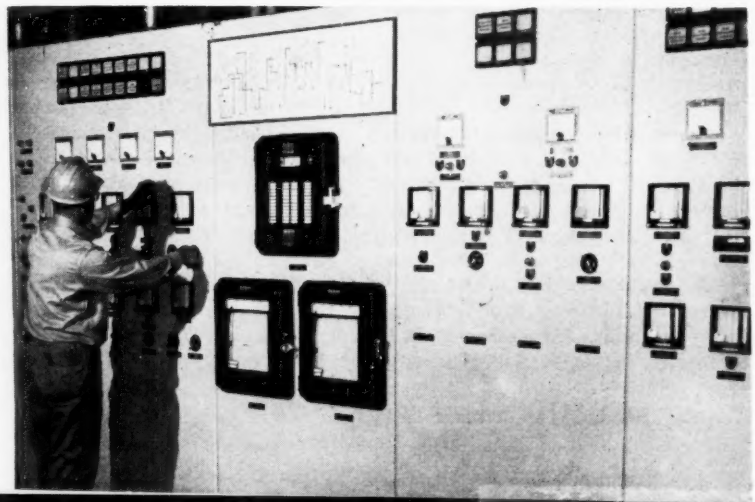
Valves, seen through safety glass, are remotely controlled.

a nondetonating flash type—resulted in severe thermal burn casualties.

At Anniston, Monsanto went to dual instrumentation for critical temperature measurements. Pneumatic and electronic instruments check each other in the control room. Electronic reading is instantaneous; pneumatic is believed to have a lag of about 20-30 seconds. There is a dial temperature indicator at each reactor so that if an operator must approach a reactor, he is able to assess danger immediately.

Electronic instruments for the control room could not be used exclusively because of danger of electric power failure. The electronic instruments are complemented with pneumatic devices, which in turn have a secondary power system—if compressed air pressure drops to 30 psi., a nitrogen system (cylinders on a trailer truck) automatically takes over the supply for the pneumatic system. A diesel generator automatically cuts in to build up air supply. As soon as pressure is up to

Control panel has dual instruments—electronic and pneumatic.



PACING PROGRESS WITH CREATIVE CHEMISTRY

Ross Hastie, Vice President, Hilton-Davis Chemical Company, Cincinnati, Ohio, discusses the Pluronic Grid with T. A. Langstroth, Director of Research and Development for Pigments and Flushed Colors.

"Wyandotte's Pluronic Grid approach is a real aid to research"

"In management, in purchasing, in development, we recognize that research time is priceless," says Ross Hastie, Hilton-Davis Chemical Company, Cincinnati, Ohio, a leading maker of intermediates, dyes, and flushed pigments for the ink, paint, and textile industries.

"To us, the Wyandotte Grid approach for evaluating the Pluronic series is a definite advance in research techniques, and a very timely one. It eliminates random evaluation of unrelated chemicals . . . suggests in advance the properties a given Pluronic grade will contribute.

"It should conserve valuable research and development time for chemists in any industry . . . enable them to learn more about their own products, and stimulate new-product thinking.

"We look forward to putting the Grid to continued good use . . . and believe each experience with it will add to our bank of product information for future needs."

The "Grid approach" is based upon the Wyandotte Pluronic* series . . . a group of related block-polymers with excellent nonionic surface-active properties, and 100% active in all forms (liquids, pastes, flakes, powders, and cast solids).

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safe level again (about 45-50 psi.), the nitrogen system cuts out. Monsanto reports the changeover is instantaneous and cannot be detected on the pneumatic recorder.

Kettle Dumping: When the system operates properly, if temperature goes above predetermined point, instruments automatically direct cooling water to reactor-kettle steam jackets. If temperature continues to rise, the kettle can be dumped by a manual valve operated from behind the wall of the kettle's cubicle. Automatic kettle-dumping was considered but rejected because of interlocking relays. The system's valves are interlocked, automatically lock open when there is a mechanical failure. If the kettle-dumping valves were tied in with this system, it might result in needless dumping of kettles.

Contents of kettle are dumped into a canal beneath the kettle, where they are neutralized with caustic.

Placing reactor kettles outdoors prevents possibility of a double explosion like the one at Nitro, since escaping fumes from a ruptured kettle are not confined within a building.

Monsanto feels that cubicles would contain an explosion so effectively that remaining reactors and plant could be back in operation by the day following an accident.

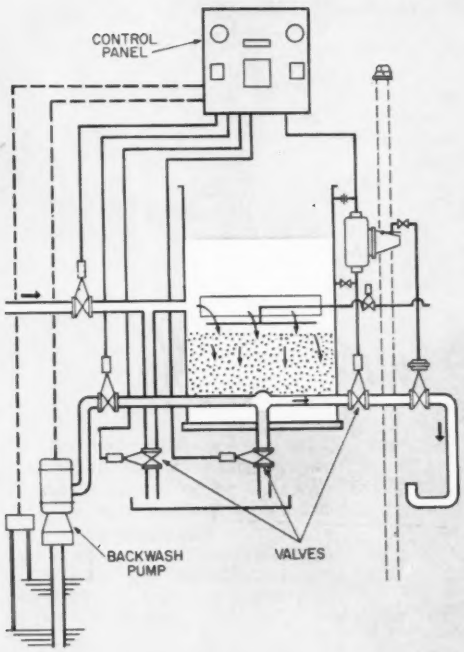
Moral Obligation: "But we think we have the answers, and that an explosion won't happen again," says Minckler. "We felt a moral obligation to supply our competition with the safety data we gathered at Nitro. And they were helpful, too."

One firm that received data from Monsanto decided this was a good time to check the safety of dual instrumentation used in all its highly exothermic processes. It found that some of the processes thought to be dually instrumented actually were not.

The Manufacturing Chemists' Assn. has advocated such exchanges of information for many years, feels that this exchange has contributed toward a trend in exchanges that "is very heartening." Only drawback in information exchange is possible antitrust action, according to one safety supervisor. But where humanity is involved, there is no antitrust objection. "Besides, process secrets don't have to be given out in this type of exchange," he adds. And Monsanto has certainly demonstrated its point.

CONVENTIONAL gravity filter and hydraulic controls for automatic operation. Approximate installed cost of a unit that will filter 500,000 gallons per day:

$21,700.00



NEW PERMUTIT VALVELESS Gravity Filter. Completely automatic operation. Approximate installed cost of a 500,000 gpd unit:

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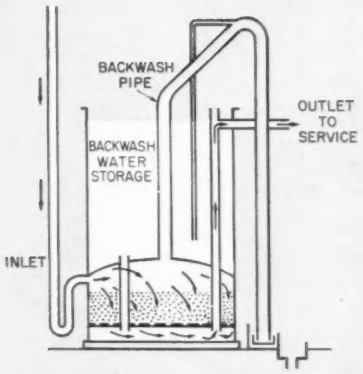

HOW IT WORKS: As dirt collects on the sand, increased head pressure slowly raises the water level in the large backwash pipe. See diagram. When it spills into the downward section of the pipe, it starts a siphon (backwash) flow that draws water down from the Storage area and up through the sand, "floating" dirt off to waste. When backwash water is gone, air enters the small tube and stops the siphon. Flow through the sand reverses and the first filtered water (rinse water) goes to Storage area until full. All flow then runs to Service.

New Valveless Water Filter Saves $$ for Industries, Cities, Electric Companies

• Big water users like city water departments, steam stations, refineries, chemical plants and paper mills can substantially reduce the cost of their water-conditioning equipment and its operation and maintenance . . . by adopting a new automatic Valveless Filter developed by engineers of the Permutit Company (N. Y.).

The simplified design makes ingenious use of the siphon and other hydraulic principles to replace expensive valves, flow controllers, pumps and hydraulic or pneumatic control systems. The design also prevents wasteful, excessive use of water for backwashing or rinsing. Tanks are shipped set-up to reduce installation costs. The absence of moving parts virtually eliminates maintenance costs.

The Valveless Filter produces uniform, high-quality water. It cannot be "forced." Backwashing or rinsing cannot be too little or too late . . . or accidentally run to Service. And the filter cannot develop common troubles like "cracked" or "upset" beds, "channeling" or "mudballs."

Single Valveless Filters or multiple units for any volume requirement are available. Present installations include units for industrial plants treating water for both process and drinking.

Send for free descriptive bulletin. Address: The Permutit Company, Dept. CW-1, 50 West 44th St., New York 36, N. Y. or The Permutit Company of Canada, Ltd., Toronto 1, Ontario.

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Market Newsletter

CHEMICAL WEEK
January 25, 1958

The second ⅛¢/lb. chipping of refined glycerine prices early last week was not unexpected (*CW Market Newsletter, Jan. 18*). It's doubtful, though, that the chess-like moves made by natural refiners and synthetic makers will continue.

The soapers originated both cuts—actions generally described as attempts to widen the spread between natural and synthetic tags—but prompt reductions by producers of synthetic glycerine have negated the moves.

There's no guarantee, however, that turtle-paced demand for glycerine, and stockbuilding (now nearly 75 million lbs. throughout the country) won't combine to pressure prices further downward. At any rate, here's today's tank schedules: 96% natural refined glycerine, 26¾¢/lb.; dynamite grade, 27½¢/lb.; synthetic material, 27¾¢/lb.

•

U.S. primary copper producers finally bowed to the worldwide market weakness, dropped prices a full 2¢/lb. below the 27¢-level they've strained to maintain since early September. And custom smelters' quotes, which have been see-sawing between 25¢ and 26¢/lb. for months, are also down again. The latest smelters' cut, to 24½¢/lb., keeps their tag ½¢ under the primary producers' new 25¢ price.

The decline in producers' prices here, coupled with curtailment of output by most of the major copper-producing countries—latest is Chile's 10% cutback this weekend—is pegged to bring some stability to an unsettled market (*CW, Oct. 12, '57, p. 137*).

•

Copper chemicals were quick to reflect the sharp metal drop. By week's end practically all copper-derived chemicals (including sulfate, chloride, hydrate, carbonate, and cyanide) were being offered at prices ½¢-3¢/lb. under previous schedules.

A few months ago most trade followers were betting that such changes were unlikely—most copper chemical prices were believed to be near rock-bottom earlier in '57. The present skidding points up one thing: in copper—and in its related chemical fields—supply/demand is still the prime market factor.

•

And there are price cuts on petroxylene, too. Reductions of 1 to 1¾¢/gal. are being posted along the Eastern seaboard and Gulf Coast by petroleum refiners uncomfortably eyeing long supplies of the solvent. Typical: Philadelphia prices are down 1¢, to a basis of 33¢/gal.; Baytown, Tex., to 31¼¢/gal.—a reduction of 1¾¢.

No word yet on reaction of coke-oven xylene producers who—at a few locations—are maintaining tags fractionally higher than those on petroxylene.

There'll be a change in the line-up of U.S. salt cake producers. In July Ethyl Corp. will terminate contracts with customers who have been taking the bulk of its 55,000-tons/year output of the important sulfate, by-product of its present hydrogen chloride producing operations.

Details: Ethyl needs HCl to make ethyl chloride for its tetraethyl lead production, has been getting the material via a Mannheim furnace roasting of sodium chloride and sulfuric acid that also turns out saltcake.

But upcoming production of vinyl chloride (*CW, Nov. 16, '57, p. 71*) and other operations will yield the necessary HCl as a by-product. (For its vinyl chloride, Ethyl will start with ethylene treated with chlorine to get ethylene chloride, then dehydrochlorinate to get the vinyl monomer and HCl.)

Will Ethyl's pulling out of the business have much affect on the market? Probably not. The sulfate is—and has been for some time—amply available. In sight, though, is a scramble by other salt cake sellers for Ethyl's soon-to-be-released customers.

•

Add another hefty chunk to the nation's pentaerythritol capacity. Heyden Newport Chemical's new automated continuous production plant (Fords, N.J.), designed to produce 25 million lbs./year of PE, is now "formally opened."

This installation plus recent expansions by other producers (*CW Market Newsletter, May 25, '57*) boosts U.S. PE capacity toward the 140-million-lbs./year total predicted by *CW* a couple of years ago (*Sept. 10, '55, p. 93*).

Big problem facing PE sellers now (as then): how to jog sluggish demand enough to absorb all the output.

•

Another Heyden Newport facility at the New Jersey site—for the production of salicylaldehyde—may be onstream this week. Anticipated production rate: over 1 million lbs./year.

The new unit makes Heyden the second commercial producer of the chemical in the country (the other is Dow). It will use a "new catalytic process" said to "represent a departure from methods of production now being used." But the firm, understandably, isn't revealing details.

SELECTED PRICE CHANGES — WEEK ENDING JANUARY 20, 1958

DOWN

	Change	New Price
Copper oxide, black, bbls., 100-1,999-lb. lots.	$0.0175	$0.4125
Copper carbonate, 55% bgs., c.l., wks.	0.0075	0.31
Copper chloride, cupric, anhyd., dms., wks.	0.01	0.41
Copper metal, electrolytic, dlvd., Valley basis	0.02	0.25
Dimethylamine, 40% soln., tanks, frt. equal., 100% basis	0.02	0.31
Monomethylamine, 40% soln., tanks, frt. equal., 100% basis	0.02	0.29
Xylene, petroleum, indust., tanks, wks., Phila., gal.	0.01	0.33

All prices quoted per pound unless quantity is given.

BASIC RESEARCH . . .
More Practical Than You Think

This editorial, one of a special series on the importance of research to the American economy, deals with an aspect of our research program that may have serious consequences in future years — the lag in basic research.

An earlier editorial in this series noted: "The keen interest of U. S. business firms in scientific research points the way to a new kind of prosperity for our economy — a prosperity based on deliberate creativeness." As a result of the dramatic increase in industry's research expenditures, more new products will be introduced in the years 1957-1960 than in any previous four-year period.

A steady stream of new products and new processes means better values for consumers and lower costs for business. And thus it promises to sustain a high level of general prosperity that defies the old laws of boom and bust. **But, as we look further ahead, there is a danger that the stream of research discoveries may run dry because of our neglect of basic research.**

This danger was described by John Jay Hopkins, late founder and chairman of the General Dynamics Corporation: "Unless there is a revolutionary development in America of pure, not applied, science, there will come a day when there is no use in trading in your old car; because the new one is no better. The only difference between this year's television set and next year's will be the appearance of the cabinet! Scientific progress will be replaced by scientific stagnation."

What Basic Research Is

Basic (or pure) research has been characterized as the pursuit of knowledge for its own sake rather than to fulfill some practical objective. It is generally carried out in an environment which allows the investigator the freedom to follow the lead of his curiosity. The scientist in basic research, in the words of Glenn T. Seaborg of the University of California, is not concerned with "utilitarian goals, but a search for deeper understanding of the universe and the living and inorganic phenomena within it."

Impractical as basic research may seem in its initial purpose, it is an essential prerequisite to applied research and product development. A few examples will show how some of the greatest technical advances of recent years have come from basic research projects that had no immediate practical objective:

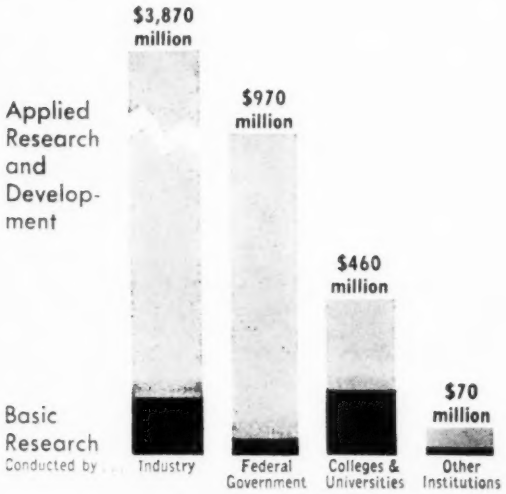
- **Radar** — an important military development of World War II with broadening commercial applications — was the outgrowth of a basic research project whose purpose was to obtain information about the height of the ionosphere, the layer of air that lies some 25 miles above the earth's surface.

- **Transistors** — the miniature devices which are already vital components of hearing aids, pocket radios and a wide variety of industrial equipment — were invented at Bell Laboratories (research subsidiary of the American Telegraph and Telephone Company) following university investigations into the electrical behavior of solids.

- **Neoprene** — a synthetic rubber — was developed by duPont with the help of basic information provided by Father Nieuwland of Notre Dame, who discovered he could control the polymerization (the linking together of molecules) of a certain class of organic compounds.

- **Nylon** — the first of the noncellulosic synthetic fibers that have revolutionized the textile industry — grew out of fundamental research by Dr. Wallace Carothers on long-chain polymers.

Only 8% of All Research and Development in the U. S. is Devoted to Basic Research



Data: National Science Foundation, "Funds for Basic Research in the United States, 1953"

Industry's Stake in Basic Research

Industry traditionally has relied upon colleges and universities and other nonprofit institutions for basic research; and the U. S. has long benefited from the greater emphasis placed on basic research in Europe. It is conventional to think that business cannot, and should not, do much about "ivory tower" projects which do not have immediate practical application.

However, there is not so much in this idea as is supposed. The examples above illustrate what Caryl Haskins, president of the Carnegie Institution, has called "the widespread paradox that the most important practical consequences are commonly the least sought after." Furthermore, it is certain that, without adequate basic research, industry's efforts to produce new and better products will become progressively more difficult. And our national defense, in an age of breathtaking military applications of science, will become increasingly precarious.

In the past, our economic growth came largely through expansion into new lands or through discovery and development of rich deposits of natural resources. Such opportunities are relatively limited today. The great opportunities now lie in discovering new materials and new properties of the materials we already have. **This is the job of basic research, and industry has a vital stake in it.**

The chart indicates the tiny share of research efforts in the U.S. that is devoted to basic research. **Only 4% of all research by industry, and only 8% of all research in the U.S., during the year 1953** (the latest for which information is available) **represented fundamental research to add to overall scientific knowledge.** Even in colleges and universities less than half the research performed is basic research. At least one Nobel Prize winner has expressed the belief that we need and should work toward a doubling of the proportion of our total research effort that is devoted to basic research as soon as possible.

What Business Can Do

Without anything like a staggering increase in the total cost of its research programs, industry could do much to expand our basic research effort. Companies with big research programs should, as a matter of successful survival, be devoting a share of the effort in their own laboratories to basic research. Significantly, companies that are already doing a notable job of basic research have also made an outstanding record of translating such research into new products for industry and the consumer.

Smaller companies may rightly regard the conduct of research projects with uncertain prospects of reward as a luxury. Some basic research, indeed, never results in any tangible payoff. But, with modest contributions, small companies can still have a part in the advance of basic research. They can join together with other companies on cooperative projects. They can support basic research through trade associations and technical societies. They can help research centers in universities and other nonprofit institutions. Arrangements are available in some instances whereby business firms can pay a fee to have access to work done by university researchers.

One way or another, it is up to private business firms to see that basic research moves forward. By doing so they will be laying the groundwork for the development of the new products and technology on which their growth, and the growth of the economy, depend.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nation-wide developments. Permission is freely extended to newspapers, groups or individuals to quote or reprint all or parts of the text.

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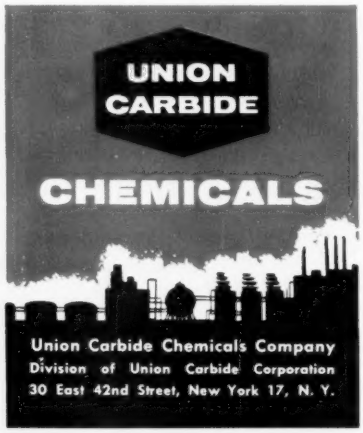

In Canada: Carbide Chemicals Company, Division of Union Carbide Canada Limited, Montreal.

Open Forum Helps Climax Win a Strike

RUMOR CLINIC

Rumors and strikes always seem to go hand-in-hand. In most strike situation some rumors are based on fact, but a great majority of them have no actual basis whatsoever.

Climax management feels a responsibility to it's non-striking and striking employees and to it's neighbors to dispel false rumors. To carry out this desire, we are buying space in the Burgettstown Enterprise in order to reach the greatest number of employees and neighbors simultaneously.

All readers are asked to report rumors they hear by telephoning Climax at WHitney 7-9511. We will publish an official answer each week to as many rumors as space permits.

Here is this week's crop of rumors.

Climax is unfairly attempting to discontinue work rules negotiated with the Union by former Company officials.

Present Climax management did attempt to negotiate changes in some work rules during the month-long series of meetings held with the Union before the strike began. There was nothing unfair about it however. Work rules, like Federal and State laws have to be changed from time to time as conditions change. For example, one rule is the amount of wages each employee receives for each hour he works. Would the Union be satisfied to permit the rule on wages negotiated in 1947 to continue unchanged?

Climax "can" eliminate the regular lunch period for all mule employees.

Ridiculous.

Climax is not interested in negotiating a contract. The Company wants the strike to continue.

Not true. Strikes, like wars, have no victors. Everybody gets hurt to some degree. To Climax the strike means a certain amount of inconvenience. To the strikers and their families it means loss of income, and possible privation. The only real issue in dispute is the Union's refusal to permit trained and experienced engineers from the Company and the Union to establish production standards fair to the Company and fair to the employees.

The strike is "over working conditions. - The Union wants to tell the Company how to run the plant."

The only real issue apparent during the negotiations appeared to be refusal of the Union to permit the employees to perform a fair days work, and management sincerely believes a vast majority of its Langeloth employees want to give a fair days work every day they are on the job. The Company made a very generous proposal in an effort to avoid a strike. It is regrettable that the Union did not see fit to accept the proposal - or to continue the negotiations unconditionally.

Excerpts from Climax ads in local paper.

Last week, Climax Molybdenum Co., a subsidiary of new American Metal Climax, Inc., was operating its Langeloth, Pa., plant at normal capacity after a five-month strike-caused shutdown. And as a result of careful strike strategy—including use of the "rumor clinic" (at left) in the local newspaper—the firm won a number of points. Among them: the right to set the work and output standards that it lost over years of union negotiations.

How did Climax get its new position? When the strike started and the plant shut down, Climax management was determined to achieve full control over work standards. It insisted on eliminating the restrictive practices that had crept into its negotiated contracts over several years, a situation that "had become intolerable." It would make sure the plant would be free to operate well above the low efficiency level that had developed parallel with the restrictive practices.

Getting Ready: At Langeloth, the firm operates a molybdenum roasting plant that makes it the principal domestic supplier of such materials. With such concentrated operation, the company found itself in a tight corner when it came to lasting out a prolonged strike. First problem, then, was to find some reasonably economical way to keep customers supplied.

Company Vice-President I.K. MacGregor, who heads Climax Molybdenum, and his staff, sailed into the situation, worked round the clock more than a month lining up other companies in the U.S. and Canada that could—and would—handle the roasting and other basic operations if Climax would show them how to do it. Eventually, half a dozen prospects took on the job, and Climax provided material-handling equipment, technologists and supervisory personnel to put the operations in business.

In some instances, the company had to build or install special handling equipment or rehabilitate facilities—indeed, in Canada, the company leased and reopened a plant that had been shut down for years. It had to rebuild ancient equipment to do the job.

Strike Under Way: Prior to the strike, June 30, '57—called by Local 1311 of United Auto Workers (a holdover unit of the old Mine, Mill & Smelter Workers)—union leadership had noticed Climax's determination. Dominic Dornetto, a representative of the UAW International, commented at the time: "The company has been shipping out every bit of stock in the plant." By coincidence, shipments passed by the windows of the office where prestrike negotiations were being held.

As the strike proceeded, Climax met pressures from other places besides its workers. The Langeloth area, though it has several plants of varying types, and supplies labor to Pittsburgh, depends heavily

ADMINISTRATION

on Climax for support of local stores and services. And a high percentage of families depend on the company. It soon became apparent that the company was standing pat on a principle, and was prepared to do so for some time. Then, word got around that Climax was still supplying full requirements of its customers—and the clamor for a reopening became still louder.

Meanwhile, Climax management mounted a vigorous campaign to explain its goals. Paramount among the tools was the "Rumor Clinic," a periodic two-column advertisement in the local newspaper, dealing with rumors arising from the strike and stating the company's position.

Results of Position: Climax management figures its stand paid off in three broad areas.

- First, it feels that under certain conditions, with proper planning and mobilization of forces, it can minimize the economic pressures that arise during a strike siege.
- Second, discoveries made and information gained during the relocation of processes and equipment have produced new ways to make the Langeloth plant more efficient.
- Third, Climax retrieved what it believes is management's right to set fair work standards at the plant to reach maximum efficiency without negotiation with the union.

LEGAL

Bayer vs. Sterling: For the second time in less than a year, Farbenfabriken Bayer's hopes of regaining substantial markets in this country have soared.

Latest boost—a unanimous ruling by the third circuit court of appeals (Philadelphia) sustaining the I.G. Farben successor company's right to continue suit against Sterling Drug (New York). Farben had sued for an accounting of assets deriving from a former partnership with Sterling in Latin America.

The ruling reversed a decision rendered last year by Judge William Smith in federal district court (Newark, N.J.). Judge Smith sustained the West German chemical and drug company's right to bring suit, charging Sterling with conspiracy to restrain trade. However, he dismissed a companion suit alleging breach of

contract by Sterling (*CW, Feb. 23, '57, p. 36*).

Judge Smith held that the breach-of-contract suit was disqualified by a joint U.S. Congressional resolution that exempts from right-of-property actions "any property or interest which, prior to Jan 1, '47, was subject to vesting or seizure under provisions of the Trading with the Enemy Act of 1917."

In reversing Judge Smith on the breach-of-contract suit, Judge John Biggs, Jr., chief judge, third circuit court, held that official termination of World War II with Germany had the effect of wiping out suspension of the right of a German national to bring suit in the U.S.

LABOR

Right-to-Work Laws: Process industry management will want to keep an eye this year on three states that appear to be headed for open warfare over right-to-work laws.

In Kentucky, opponents of such a law have just scored a quiet but important first-round victory in the state senate. But in Washington state and California, right-to-work advocates are busy seeking voter support to initiate a proposal that would appear on ballots in the November general election.

Foes of right-to-work laws in Kentucky scored this triumph: State senate Democrats teamed to change the

Reward for Individual Effort

On display last week at St. Louis, Mich., was this handsome Tiffany silver bowl. It is Michigan Chemical Corp.'s first effort at giving tangible, physical and public recognition to its individual employees for outstanding contributions to company operations. First recipient of the Michigan Chemical Achievement Award was Rare-Earth Operations Supervisor Mark Frimodig (*left, above*).

Operations Vice-President Fred De Maestri, who presented the bowl, summed up the company's attitude: "We can't put group effort at such a high premium that we smother leadership and dampen individual achievement."

The award will be presented annually, if Michigan management feels there is a worthy candidate for it. The company also has a stock-option plan.

ADMINISTRATION

word "shall" to "should" in the rules that govern committee conduct when considering bills. The rules state that a committee "should" report every bill. Opponents feel that they now will be able to bottle up in committee any future right-to-work legislation.

In Washington, however, a Committee for Voluntary Unionism is working to place before the voters a proposed law that would void any agreement made, renewed or extended, that required membership or non-membership in a labor organization. A similar proposal was defeated by the voters in '56.

California's Citizens Committee for Democracy is sponsoring a plan that's destined to become a heated campaign issue. The proposal would outlaw the union shop.

On record as favoring a "fair and equitable" right-to-work law is U.S. Senator William Knowland, Republican minority leader and candidate for California's governorship. State Attorney General Edmund Brown, who hopes to oppose Knowland in November as Democratic candidate, is against such legislation.

KEY CHANGES

Hartley W. Voigt, to vice-president, Blockson Chemical Division, Olin Mathieson Chemical Corp.

Henry B. Sayler, to director, Unexcelled Chemical Corp. (New York).

James F. Eversole, to vice-president, Union Carbide Development Co., division of Union Carbide Corp.

Nat C. Robertson, to general manager, research and development, Spencer Chemical Co. (Kansas City, Mo.).

Stuart T. Henshall, to executive vice-president, Merck Sharp & Dohme, (Philadelphia), division of Merck & Co. (Rahway, N.J.).

DIED

Albert E. Cleghorn, 52, president, National Aniline Division, Allied Chemical & Dye Corp., at New York.

Willis R. Whitney, 89, founder and former director, General Electric Research Laboratory (Schenectady, N.Y.), at Schenectady.

J. E. Hanny, 70, retired vice-president in charge of manufacturing, Crown Zellerbach, at Portland, Ore.

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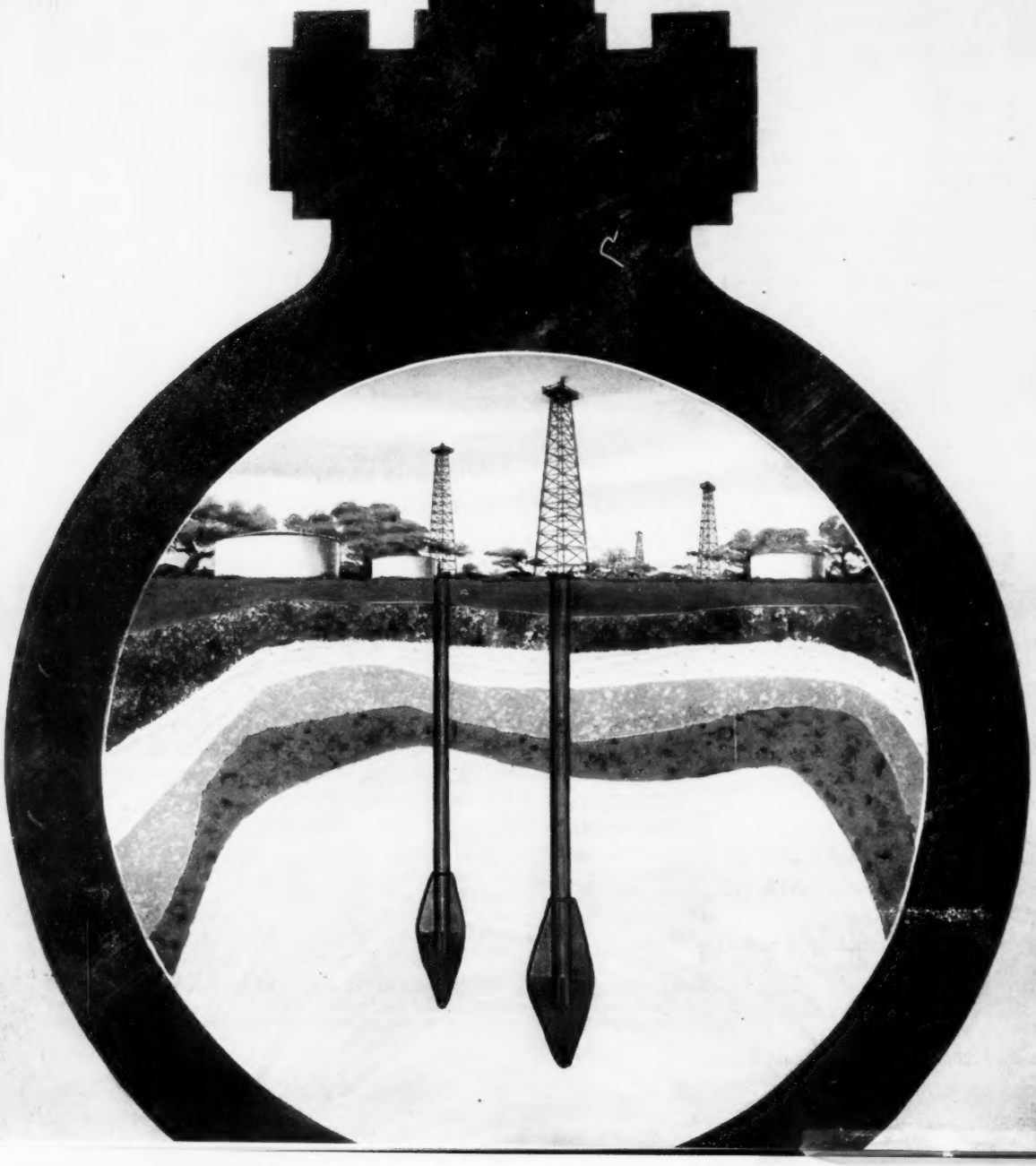
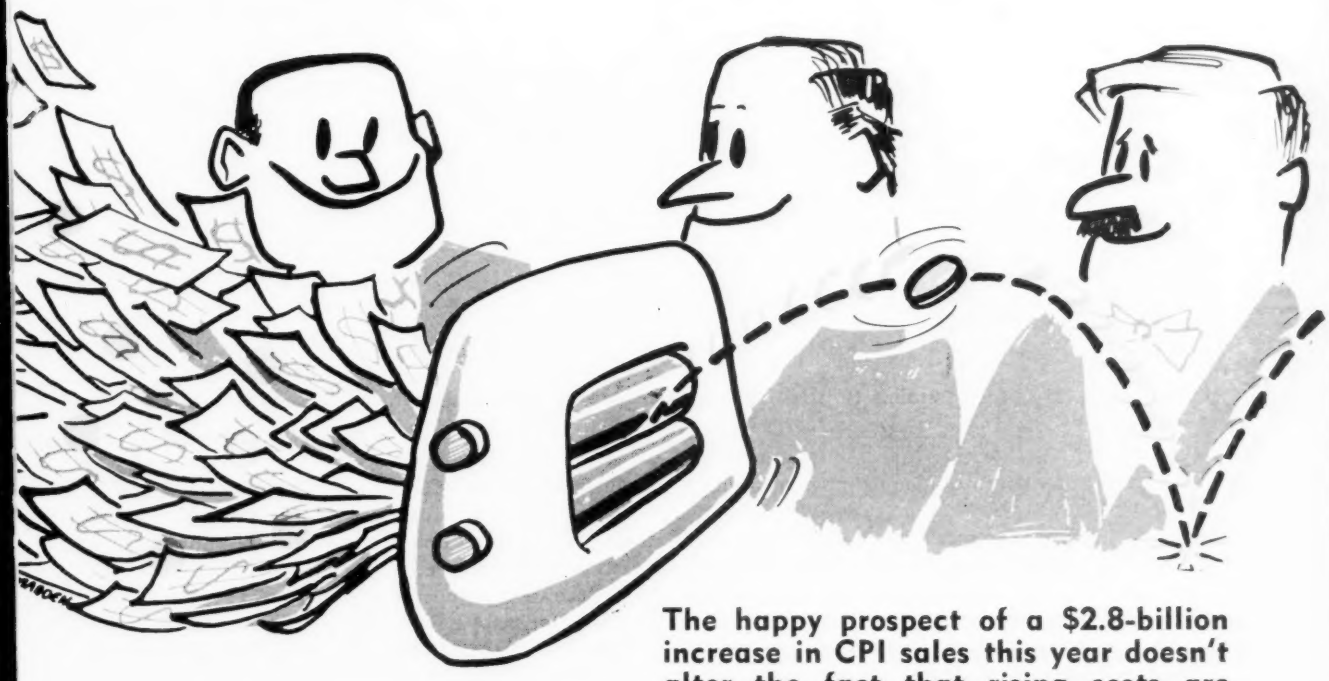




The happy prospect of a $2.8-billion increase in CPI sales this year doesn't alter the fact that rising costs are wringing the substance out of profits.

by Winfield McNeill

How to Ease the Pressure of the Big Profit Squeeze

THE LEAN LOOK apparent in many process companies' net-profits column isn't entirely the result of economic pressures beyond management's control. Shrinking profit margins may often be traced to the lack of up-to-date cost-control techniques in more than one phase of a company's operations. Without good controls, rampaging costs can be as damaging as outside economic influences.

That cost controls are sorely needed in many process companies is evidenced by the increasing number of cutbacks in personnel, budgets and production. In most cases, cuts like these are last-minute attempts to save profits.

It usually takes a setback of the kind that industry is now experiencing to convince management people that profits must be continually fought for. Management's weapon: a well-thought-out, well-administered cost-control plan. It can keep operating costs in check, bolster a firm's ability to meet the most stringent emergencies—even widespread business recession.

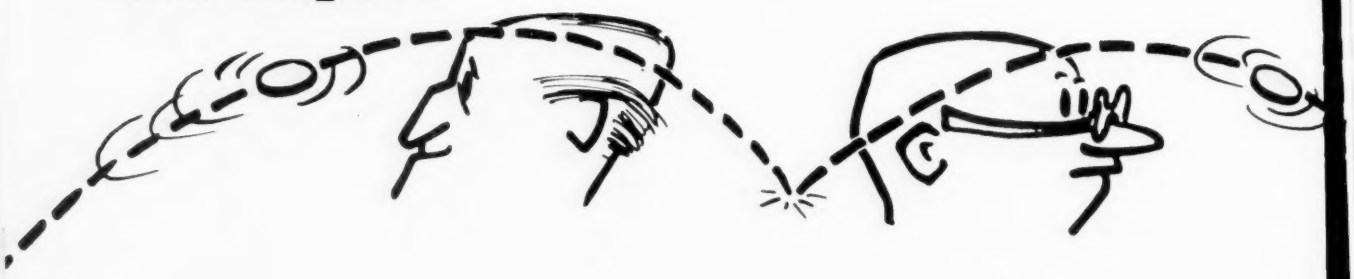
How to go about adopting such an organized approach to cost cutting is the subject of this CHEMICAL WEEK report. Companies that already have felt the profit squeeze, yet continue to ignore their own shortcomings in controlling costs, cannot hope to successfully withstand economic buffetings.

OBJECTIVES ARE CLEAR

To survive the cost-profit squeeze, two basic principles of positive executive control must be practiced:

1. Management must be fully informed of all the key facts and figures needed to reveal cost-profit trends for products, product groups, departments, divisions and for the company as a whole.

2. Management must install and maintain the necessary controls of inventories, costs and plant performance



Smiles turn to frowns when profits end up as a mere pittance of the return

—make cost reduction a continuing program throughout the company.

These principles may seem simple, but they are not easy to apply. Reason: cost-control methods and techniques are so varied and transient that it is difficult to know the best method for any particular case. And it's not easy to keep abreast of the latest techniques. What was considered good practice only a few years ago may have been superseded by everything from a "fad" technique to a lasting improvement.

Right now, for example, in the area of inventory valuation alone, management is confronted with a half-dozen choices: fifo (first in, first out), lifo (last in, first out), prime cost (which figures in material and labor costs only), standard cost at high level and so-called "normal" level. In addition, there's the technique of actual cost averaged with beginning inventories.

In the area of depreciation, management must select from straight-line depreciation, declining balance depreciation, sum of the digits, and depreciation allowed for tax purposes on facilities that are wholly, or in part, covered by certificates of necessity.

In the area of profitability, there are still other methods to contend with—gross profit, net profit before taxes and profits before fixed charges plus general expenses.

In the area of performance standards for measuring factory efficiency, management men must choose between theoretical standards, attainable standards and standards for pricing inventories.

Making matters worse, professional consultants and experts disagree among themselves on the right choice and application of these various methods. Industrial management schools and textbooks offer little guidance; most simply outline the available methods, but seldom deal with the problem of which one to employ to a company's best advantage.

How then can a policymaking group be certain that its company has made the wisest choice of methods in all the important areas of cost control? Here's a good basic philosophy: trust to methods that show the facts of your business operations as they actually exist, in terms of dollars spent or earned.

Records of company costs and profits offer the best guides for mapping out a plan of action. In using this data, however, management must be sure that the cost and profit figures express conditions as they actually exist.

As in mathematics (where all factors in a given problem must be expressed in consistent terms), so in cost control the base of calculations should remain the same.

If, for example, depreciation time is not representative of the actual life of a piece of equipment; if standard costs for materials, labor or overhead are not representative of existing plant conditions; if inventories are priced at some artificial base, how can costs and profits be anything but a hodgepodge of unrealistic figures?

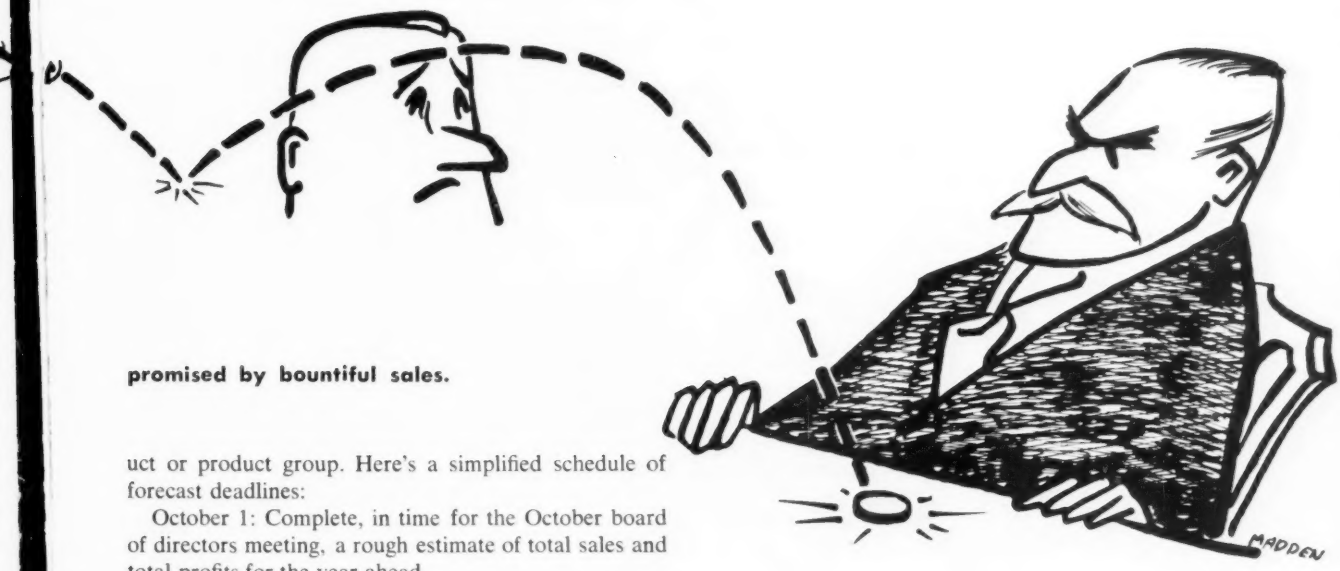
Process companies that took the maximum allowable depreciation on their equipment and plants in past years (knowing that this wasn't consistent with the actual depreciable life of the facilities) now find themselves with less than normal deductible depreciation left to write off. As a consequence, their already-slim profits are being taxed at higher rates than if fast write-offs had not been taken—and at a time when profits are relatively hard to come by.

Moral: if management seeks to cut costs to the bone and fatten profits, it must first know what its actual costs and profits are.

FORECASTS ARE IMPORTANT

Forecasts of costs, profits and sales are powerful weapons to bring to bear on rising costs and shrinking profit margins. They permit the planning of strategy in this vital area.

For the most part, forecasts should be made (for the coming year and the next five years) by individual prod-



promised by bountiful sales.

uct or product group. Here's a simplified schedule of forecast deadlines:

October 1: Complete, in time for the October board of directors meeting, a rough estimate of total sales and total profits for the year ahead.

November 20: Complete formal financial-statement estimates of sales and profits for the year ahead. In addition, complete the supplementary statements detailed in the next column. Estimate year-by-year sales for the next five years. Use this as a basis for preparing five-year income statements and for figuring future cash needs.

December 1: Schedule budget meetings with department heads and/or division heads to discuss, analyze and revise proposed budgets.

January 15: Adopt budgets for the year ahead and for the next five years. Review budgets quarterly for the year ahead.

How do forecasts originate? Sales estimates should come from the sales department(s) of the company. These "grass roots" estimates must be reviewed by headquarters sales managers. When a process company is big enough to employ a headquarters sales statistician, he can temper (or enlarge upon) the sales manager's forecasts.

Note: where product groups consist of many individual items, it is easier to forecast total sales for the entire group than it is to forecast for each individual product. Group forecasts can be broken down into individual product forecasts on the basis of each product's usual share of the business. Allowances can be made, of course, for new products.

Management must have information, too, from other sources: company treasurer, controller, engineering department, research department.

For the October board meeting, for example, preliminary nine-month profit-and-loss statements by divisions, and consolidated for the entire company, will reveal significant trends in the cost-profit picture.

By the time the December budget meetings roll around, management should have access to the following supplementary data for: 1) the current year—10 months actual, November and December estimated; and 2) estimated for the coming year:

1. Profit-and-loss statements, by division and consolidated.
2. Balance sheets, by division and consolidated.
3. Statements of estimated net profits before taxes, by product and/or product group.

In addition, top administrators should see research and development spending figures broken down by project and by product (or group). For example, sales, net profits before taxes and R&D spending averages for the past five years can be compared with similar figures for the coming year.

Capital expenditure requests—by project—for the next five years are also needed. With these, management can estimate future cash requirements and expected payouts for each project. Cash budgets for five years into the future should be part of the forecast package.

WATCH STANDARDS USE

Today, many companies employ so-called "textbook" standard costs in their accounting, to estimate selling prices, to measure product profitability and to gauge factory performance. Much to management's chagrin, these textbook standards are not providing consistently successful answers to cost control. Why not? Primarily, for three reasons:

1. Special studies that usually form the basis for

Facts, forecasts and pinpointed costs are keys to efficient control.

textbook standard costs do not give an accurate picture of actual costs. The latter have been built up over a period of time to account for every dollar spent on raw materials, labor and overhead—costs that make up the true cost elements of producing a product. It is usually difficult for a special study to uncover and express all the variables that enter into chemical processing costs.

2. In using textbook standard costs, many firms find that they lack adequate staff to keep these costs up-to-date and in line with changing processing methods. As a result, many companies end up using costs that are neither representative nor current.

3. Textbook standard cost systems usually result in building up lump sum differences between standards and actual costs for labor, overhead and raw materials that are impossible, in most cases, to apply to individual products. The excessive time that highly paid executives and engineers often spend in trying to unscramble these differences could be more profitably spent by lower-echelon personnel in building up actual costs.

A system that has proved reliable, easy to maintain and less costly to operate, involves adopting a three-point control program:

1. Maintain a monthly quantitative balance of material input vs. product output to control inventories of both finished goods and work in progress.

2. Install a working system for determining actual factory costs, by size and grade, for each product. Only in this way can total dollars spent on materials, labor and overhead be accounted for. Details of a suggested system are given in the next section, *Organize for Cost Reduction.*

3. Make periodic checks, annually at least, of actual net profits before taxes, either by product or by product group.

Further explanation of point three may be needed. Net profit by product provides an indispensable cost-control tool for management, especially when the time comes for decision making. Net profit by product clearly shows up unprofitable products, product groups and sales territories. It also helps management to appraise competitive selling prices.

Net profit by product is one sure way of accounting for every dollar spent to produce and sell a product. It would, for example, reveal the difference in profitability between two products, A and B, that have identical selling tags and factory costs but different freight, warehousing, selling, advertising and R&D charges (*see chart on opposite page*).

ORGANIZE FOR COST REDUCTION

Organizing for cost reduction in a chemical process company requires careful planning on management's part.

Management not only must know how and where money is spent, but also must be able to state how much

and where money should have been spent. Knowing whether or not plants are meeting standards of plant performance is a key part of this knowledge.

To set up a working system that reveals all the needed information on plant operating performance, management should:

1. Separate each plant into cost-control centers.
2. Set standards for direct labor, by operation and by product, at each cost-control center.
3. Set standards for each item of factory overhead at different levels of operation (100% of capacity, 95% of capacity, 90%, 80%, etc.).
4. Set standards for materials losses, yields, scrap, etc.

Industrial engineers are best qualified to create and maintain these standards, and to report deviations to management.

When such a plant-performance control system gets rolling in a company, administrators find that the two basic principles of cost control (mentioned earlier) are met. Management knows: 1) what and how much its costs are; and 2) that a going system of cost reduction is in force throughout the organization.

FERTILE AREAS SHOW UP

Raw materials usually present the most promising area of cost reduction.

Because of the high unit prices of chemicals, raw material costs are often the biggest cost factors in many operations. Even small improvements in use of raw materials and in finished-product yields can result in substantial dollar savings. In one company department alone, for example, a 3% saving in the dollar value of raw materials yielded dollar savings of $128,000/year.

In process companies, savings of this kind usually can be effected in production departments in any number of ways:

1. Paying greater attention to low yields and material utilization.
2. Encouraging liaison within, and between, production staffs. The aim: to uncover, analyze and reduce losses.
3. Reducing batch formulation losses caused by excess usage of raw materials, use of higher-quality materials than is necessary, use of raw materials in costlier form than is needed.
4. Reducing mechanical losses.
5. Improving the organization of quality-control departments.
6. Updating process and control instructions to prevent costly operating errors and to speed batch or product approvals.
7. Increasing batch sizes and length of production runs to reduce material losses in cleanup.
8. Installing processing improvements to boost operating efficiencies and by-product recoveries.
9. Applying purchasing specifications to prevent use of inferior materials.
10. Decreasing losses in reworking off-standard materials.

Perhaps the second most important target for cost-conscious management turns out to be labor costs. In one process company, for example, a saving of $165,000/year was realized by eliminating duplication of work (which permitted a reduction in staff from 79 to 56 plant workers) and increasing the number of batches turned out from 940 to 942/month.

In the chemical process industries, labor savings (without added wage incentives) usually can be achieved by:

1. Training personnel more effectively.
2. Using operating crews more flexibly.
3. Increasing work opportunities.
4. Eliminating duplicate operations.
5. Improving the organization of operating divisions or departments.
6. Weeding out ineffective supervisory personnel.
7. Improving operating methods.
8. Using labor-saving devices.
9. Going to larger batch sizes.
10. Improving work schedules.
11. Eliminating abnormal delays and waiting periods.
12. Transferring temporarily idle personnel to other necessary work.
13. Initiating method studies to lower high-labor processing operations wherever possible.

Figure Profitability by Net Profit

Gross profit may show no difference

	Unit Cost	
	Product A	Product B
Selling price	$1.00	$1.00
Factory costs	0.60	0.60
Gross profit	**0.40**	**0.40**

Net profit would show a big difference

Gross profit	**0.40**	**0.40**
Distribution costs	0.06	0.08
Selling and advertising costs	0.10	0.03
Research and development costs	0.15	0.02
Other administrative costs	0.05	0.05
Net profit before taxes	**0.04**	**0.22**

A plenitude of systems is offered for the control of inventories, costs, plant performance, standards.

Plenty of other areas outside of raw materials and labor utilization will turn up as ripe for cost cutting once management begins to take the systematic approach to cost control. These areas will vary from company to company and from process industry to process industry.

WATCH CAPITAL SPENDING

Capital expenditures play such a vital role in shaping the cost and profits picture that they are important in any cost-control plan.

A process company's future depends largely on the skill and care that its management exercises in investing capital funds. The choice of investment not only affects immediate earnings but also determines the firm's long-range prospects and competitive position. Capital expansions that do not bring in income as expected endanger the company's credit position, even threaten its existence.

Available funds spent on one project are not available for any other purpose. Unplanned future capital expenditures may not find ready cash available.

Since future costs and profits are so closely tied to capital expenditures, a systematic approach to capital-cost control is badly needed. Controls in this area fall into the following broad categories in practically all process companies:

1. A capital budget must be created that includes long-range expansion plans.
2. Capital expenditure approvals begin at the plant-management level and extend upward through top management, usually to the board of directors.
3. Progress reports are reviewed by management on approved, but still-incomplete capital projects.
4. Audits of anticipated return on investments vs. actual returns for completed projects are reviewed by management.

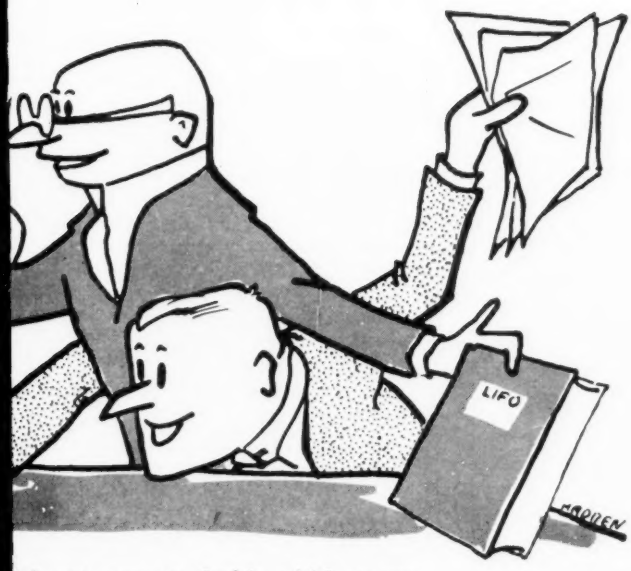
Capital appropriations committees bear the brunt of administering these controls—the company controller certifies to the accuracy of cost data and return on investment; the company treasurer approves the availability of funds; the chief engineer sanctions appropriations for construction, design, process, etc.; a top-ranking company official confirms that capital expenditures are in line with the company's interests and long-range expansion plans.

Because of the magnitude of capital outlays at today's inflated prices, and the increasing difficulty of obtaining capital funds, most process companies are already exercising the utmost care in applying controls to capital appropriations. Without this control, costs can never be minimized, nor profits maximized.

THE PAYOFF TAKES TIME

Process company managers cannot expect systematic cost control to pay off overnight. Most cost-control systems of the type described need at least one year to begin proving their worth. While cost controls are being designed and standards established, the program must be carried practically as a total liability. After one year, however, results begin to add up and thereafter savings accrue rapidly.

Case in point: in a chemical firm with $20 million a year worth of sales, no cost savings were reported in the first year of cost control. After two years, monthly savings jumped to four times the monthly cost of control. After three years, savings were nine times monthly costs. After four years, savings amounted to 20 times



It's not easy to decide which to use.

monthly costs. By the end of the fourth year, accumulated savings were reported at $130,000/month—$1.5 million/year.

DON'T OVERLOOK R&D COSTS

On an industry-wide basis, process companies this year will spend about 1.3¢ on research and development for every $1 of product sold. For the entire CPI in 1958, this totes up to an estimated outlay of $996.5 million for research and development—assuming gross sales of around $78.1 billion.

For the chemical and allied products sector of the CPI, R&D expenditures per dollar of sales are 2.2¢. That's based on an outlay of $550 million for R&D and $25.1 billion worth of gross sales.

Because the bulk of these R&D expenditures go for applied research, use research, pilot-plant research and process development, management must strive to evaluate the cost and utility of R&D outlays in much the same terms as it would any other cost. R&D costs should be charged to a project, and project costs later interpreted along with other costs in terms of net profitability by product or group. Basic research costs, however, must be written off in more intangible terms.

Research managers should be charier than ever about project budgets, demand facts, figures and forecasts to prove the need for expenditures.

Knowing when to stop developing and begin marketing a new product, process or development is an important part of pruning R&D costs. Management's job is to pry projects loose from the R&D stage just as soon as the development is marketable, competitive and salable at a profit satisfactory to the company.

Today, diversification in research is as important as product diversification. Research that touches more than one area of company activities is highly desirable because it lessens the possibility of R&D funds going down the drain on one or two projects that don't pan out.

In evaluating R&D budgets, management should repeatedly ask and answer these questions: Should we spend R&D funds to develop our own know-how in a special area of technology? Will we profit more by licensing from a competitor or even buying into a company that already controls the know-how?

To answer these questions, cost studies can be made to show what profits would accrue by each route. All other factors being equal, the plan that returns the best investment over the long haul is the one to choose.

Evaluations of individual research and development projects should be made each year when company budgets are prepared (*see p. 95*) and whenever new major R&D projects are approved. Close scrutiny must be given to R&D budgets too before transferring projects from laboratory to pilot stage to plant.

Reasons for this are clear. Since the project was first undertaken, much may have happened: 1) patents may have issued to another company; 2) market requirements may have changed; 3) experimental data may have altered the economics of the project; 4) company funds may be needed elsewhere.

At budget time, research programs must be reviewed by the company executive committee or top management group along with all other budgets. With statistics and forecasts such as those described earlier (*p. 95*), management can ascertain whether or not a particular product or product group has been losing money.

With such a rein on R&D costs, money spent for research today can be justified not only in terms of long-term profits but present-day company needs. Planned R&D expenditures and new product developments that are "managed" can cut the time down substantially between initiation of a project and return of profits on R&D investments.

Meet the Author

Winfield McNeill is vice-president of business services for Calkin & Bayley, Inc., New York industrial consultant specializing in operating, marketing, and management problems.

Cost control—subject of this CW Report—is one of McNeill's specialties. Another is the diagnosis and cure of management financial difficulties.

More than 30 years of his business career (after graduating from MIT in engineering administration with an option in chemical engineering) were with four prominent chemical process firms—General Aniline & Film, Colgate-Palmolive, E. R. Squibb and Procter & Gamble. McNeill has held such key posts as vice-president-controller, director of industrial and personnel relations and production superintendent.

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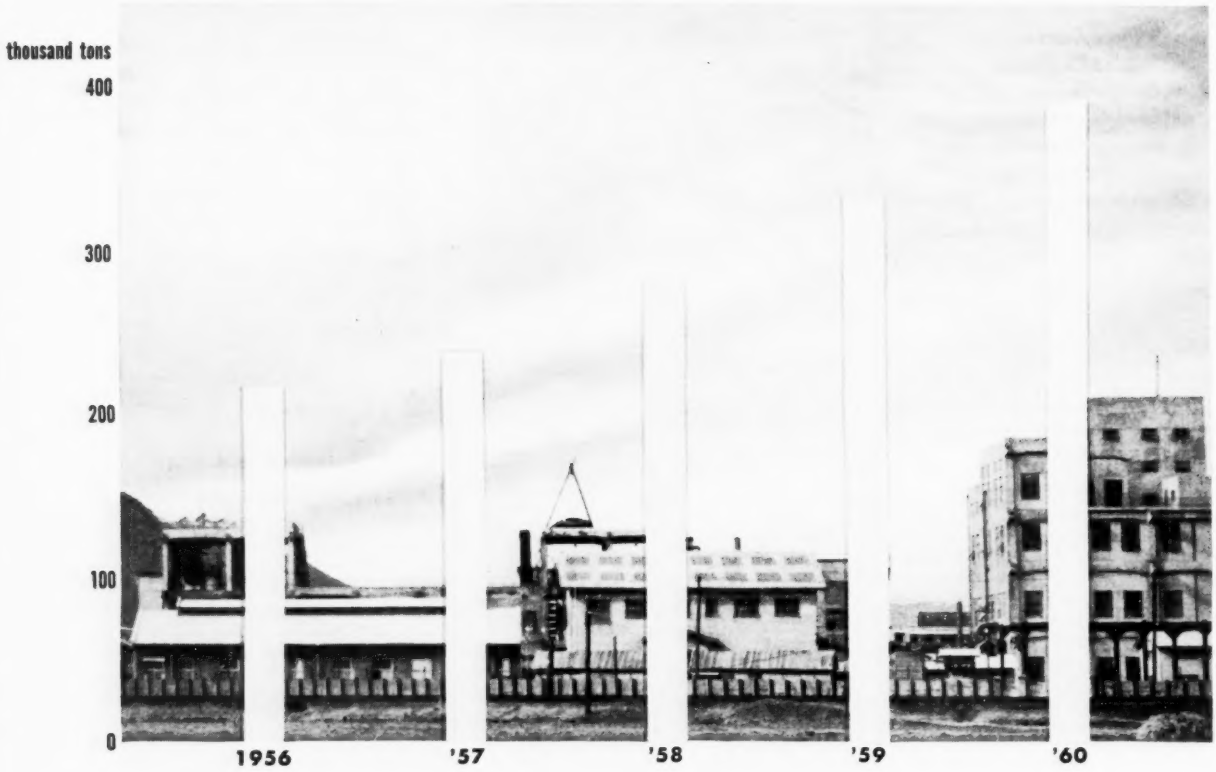
Japan's Rising Plastic Production



Plastic Target in Japan: 400,000 Tons

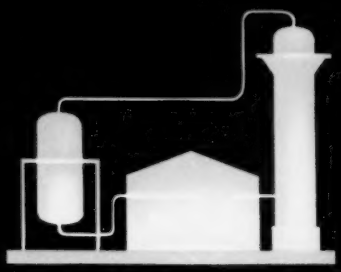
The plant shown above—Asahi Dow Chemical Co.'s polyvinylidene chloride unit—focuses attention on the Japanese plastic industry, which is preparing to turn out a minimum of 400,000 tons of resins by 1960. That's an impressive 82% surge over '56's 219,000-tons output.

Until this past year, Japan exported small amounts of resins—mostly cellulosics, polyvinyl chloride; it imported major quantities of resins such as polyethylene, polystyrene and acrylics. This picture is expected to change rapidly in the immediate future. Plants for polyethylene, polystyrene and acrylics now planned or under construction are expected not only to meet domestic demands but also to provide materials for export.

Planned output of polyvinyl acetate in '60 is some 102,000 tons, which will make it the pace-setter among resins that year. In '56, the output was some 30,000 tons.

Polyvinyl chloride output target for '60 is 72,000 tons, keeping PVC as one of Japan's top-volume resins. Urea resins are also slated for a large increase: output target for '60 is a minimum of 65,000 tons. Polyvinyl alcohol output is scheduled to be some 47,000 tons, compared with 15,000 tons in '56.

Ethylene Oxide Plants by SD



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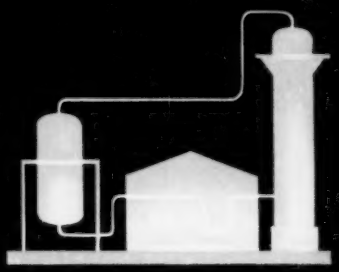
Orange, Texas



Naphtachimie
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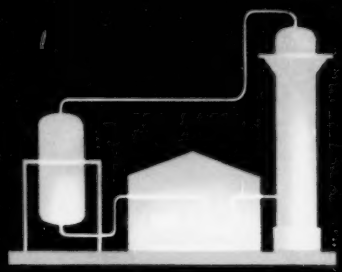
(Original plant plus two expansions)



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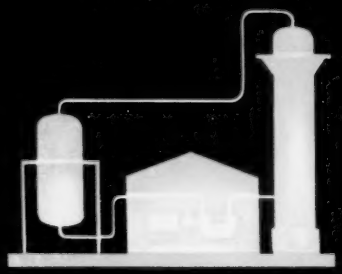

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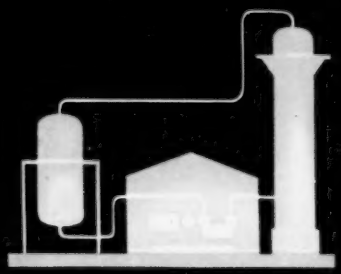

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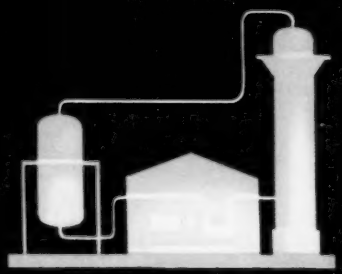

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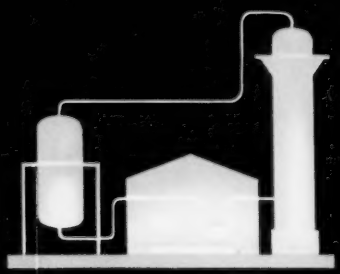

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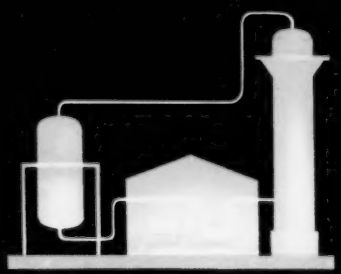

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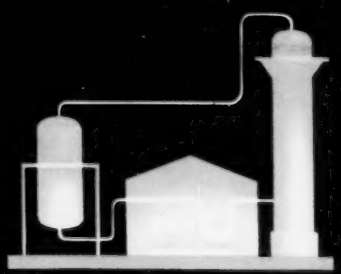

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